DOCUMENT RESUME

ED 226 532 EC 151 010

TITLE Institute for the Study of Exceptional Children. Final Report, August 1, 1977-June 30, 1982.

INSTITUTION Educational Testing Service, Princeton, N.J. Inst. for the Study of Exceptional Children.

SPONS AGENCY Special Education Programs (ED/OSERS), Washington, DC. Research Projects Branch.

PUB DATE 30 Jun 82

NOTE 727p.; The document was also prepared by St. Luke's-Roosevelt Hospital Center, New York, NY. Parts of the document are partially legible.

PUB TYPE Reports - Descriptive (141)

EDRS PRICE MF04 Plus Postage. PC Not Available from EDRS.

DESCRIPTORS Disabilities; Exceptional Child Research; *Handicap Identification; *High Risk Persons; *Infants; Interdisciplinary Approach; *Intervention; Professional Education; *Student Evaluation; Theories

IDENTIFIERS Final Reports; *Institute for the Study of Exceptional Children

ABSTRACT

The final report details the background and activities of the Institute for the Study of Exceptional Children, an interdisciplinary collaborative effort of two research-service organizations: the Infant Laboratory of Educational Testing Service in Princeton, New Jersey, and the Pediatrics Service of the Roosevelt Hospital in New York. An introductory section reviews the Institute's theoretical principles as well as its structure, goals, functions, and priorities. Four goals are identified: identification of young children at risk for handicaps; assessment of their social, emotional, and cognitive functioning; intervention; and training of professionals in an interdisciplinary setting. Activities from each of the Institute's 5 years are summarized. The administrative organization, with its four units (detection, research, intervention/evaluation, and training/products/dissemination units) is described. The largest part of the final report is devoted to indepth information on activities of each of the four units. Among detection unit projects discussed are a project to identify handicaps in a population of at-risk infants and a project to develop instruments for measuring infants' competencies. Among projects of the research unit are studies of contingency learning in 10-week-old and premature infants and of infant attention. Three major activities of the intervention and evaluation unit (contingency intervention, communication development, and evaluation) are considered. Three final chapters detail the Institute's products (publications, presentations, and technology and assessment instruments), dissemination efforts, and training activities. (CL)

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INSTITUTE FOR THE STUDY OF EXCEPTIONAL CHILDREN

Submitted to
Research Projects Branch
Special Education Programs
U.S. Office of Education
Washington, D.C. 20202

June 30, 1982

Final Report

Institute for the Study of Exceptional Children
Educational Testing Service
and
St. Luke's - Roosevelt Hospital Center

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EDUCATIONAL TESTING SERVICE
PRINCETON, NEW JERSEY 08541

Institute for the Study of Exceptional Children

Final Report

Research Projects Branch

Special Education Programs

August 1, 1977 - June 30, 1982

by

Institute for the Study of Exceptional Children

Educational Testing Service

Princeton, New Jersey 08541

and

St. Luke's - Roosevelt Hospital Center

New York, New York 10019

June 30, 1982

I. ABSTRACT

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The Institute for the Study of Exceptional Children, an Institute within the corporate structure of ETS and funded by the Bureau of Education for the Handicapped, is an interdisciplinary, collaborative effort of two research-service organizations: the Infant Laboratory of Educational Testing Service in Princeton and the Pediatrics Service of The Roosevelt Hospital in New York. The underlying goal of the Institute is to meet the growing need for productive and effective solutions to the problems of handicapped and at-risk young children. Over the past three years, the Institute has formed a comprehensive detection-intervention-research system to serve many of the needs of handicapped infants and the professionals who work with them, cutting across the traditional boundaries of developmental psychology, pediatric medicine, and special education. Both organizations comprising the Institute have unique expertise and experience crucial to this endeavor.

The Infant Laboratory was formed in 1968 as a research group within Educational Testing Service to study the development of infants and young children. Composed of a staff of approximately 15 psychologists, special educators, and child care specialists, the Infant Laboratory annually studies more than 400 babies ranging from one month to four years of age. The research interests of the Laboratory are broad and varied and include socioemotional development, perceptual-cognitive skills, and communicative behaviors of both normal and handicapped infants.

The Pediatric Service of The Roosevelt Hospital is a component of the Department of Pediatrics of the College of Physicians and Surgeons of Columbia University. The Pediatric Service is involved in direct health care delivery, training and research in primary care pediatrics and in developmental disabilities.

In addition to these two organizations, the Institute staff works closely with the Coalition of Administrators of New Jersey Infant Programs, an umbrella organization for primary care programs in New Jersey serving handicapped and at-risk children ages 0-3 years. The Coalition includes home- and center-based programs serving both rural and urban areas. The Coalition serves as a support system for the infant programs comprising it, disseminates and coordinates information on what is going on in the field of infant stimulation, and integrates the services of its members.

The interface of these three organizations through the Institute affords a unique opportunity for an interdisciplinary approach to the many problems in intervention and research with handicapped and at-risk children, based upon the premise that a cooperative effort among professionals from several disciplines is crucial to effective, long-term solutions to the needs of handicapped and at-risk children.

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III. INTRODUCTION

A. THEORETICAL PRINCIPLES OF THE INSTITUTE

The Institute's structure and purpose are predicated on five theoretical principles of human development. The detection and intervention strategies developed in the course of the Institute's research projects reflect these principles. Following is a brief explanation of each of these five principles and their relation to Institute endeavors.

Competent Infant

Even at birth, the infant is a very competent individual, who is able to organize and respond to experiences in the social and nonsocial world. This view of the "competent" infant is evident in our approach to the Research, Detection, and Intervention endeavors of the Institute. Both the Detection and Research Units focus on the skills demonstrated by handicapped, at risk, and normal infants from birth onward. In our Research effort, we look for common patterns in the abilities shown by at-risk infants and infants with different handicapping conditions. The goal of our Detection effort is to pinpoint missing or underdeveloped competencies in the infants. Through both our research and detection efforts we hope to learn whether there are certain competencies which handicapped or at-risk infants do not have which make them unable to acquire information about their physical and social world.

The underlying assumption of our Intervention endeavor is that handicapped or at-risk infants can be helped to become more competent. By working with children in areas where they do have skills, and by helping them to develop in their weaker areas, we are encouraging a sense of competence and the competence motivation necessary for further development.

Active Infant

Contrary to the historical view of the infant as a passive organism, the young infant is really very active. This is true both for the social and nonsocial domains. For example, in the social domain, infants not only respond to their parents' initiations, but also affect their parents' behavior (Lewis & Rosenblum, 1974); in the nonsocial domain, Piaget (1954) has amply demonstrated that the infant is active in constructing and altering its knowledge of its world.

The Research, Detection, and Intervention efforts of our Institute reflect our belief in the active infant. In our Detection work, we are assessing handicapped and at-risk infants' participation in their physical and social world and comparing it to that of normal infants. In our Research efforts, we look for any relationship between patterns of inactivity or dysfunctional activity and certain types of handicapping conditions.

The purpose of our Intervention efforts is to structure an environment for the handicapped or at-risk infant which promotes activity. Further, by creating an environment which allows the infant to be successful in interactions with the social or physical world, we will develop effectance motivation and facilitate adaptive, rather than dysfunctional, interactions with the physical and social world.

Interdependence of Skills

The different domains of development—socioemotional, physical, perceptual-cognitive, communicative-linguistic—affect one another in complex ways. For example, the meaning of language is first learned within a specific social context. Only later is the child capable of understanding or producing language independent of social context.

The implications of this view for Detection, Research, and Intervention are clear. One major task of our Research Unit is to pinpoint the relationships between seemingly separate competencies—and to pursue the implications of these relationships for the course of development. Our Detection efforts clearly emphasize the interaction of skills. By looking at each infant's development by means of a skill profile, we readily detect areas of development which seem weak and might be related. This information is crucial to effective intervention. A major goal of our intervention effort is to address identified deficits early and directly in order to prevent a dysfunctional interaction of skills, which results in further impairment.

Social Nature of the Organism

The infant always interacts and learns within a social context. In fact, the child's earliest knowledge is organized around social information (Sander, 1977; Stern, 1974). Therefore, in order to understand physical and cognitive growth, one must know how the social environment molds and alters them.

A focus on the social nature of the infant and the importance of competencies in dealing with the social world is evident in our approach to the Research, Detection, and Intervention tasks of the Institute. A major goal of the Research Unit is the study of the social development of handicapped and at-risk infants, using research paradigms already used for studying social development in normal infants.

An integral part of our Detection endeavor are measures of social skills—mother-infant interaction, socioemotional scales and a self-recognition task. An underlying assumption of our Intervention effort is that learning takes place in a social milieu. For this reason, our intervention strategies directly address the necessity for successful contingencies between the child's activity and that of social objects—e.g., the importance of the mother's response to the smallest movement of a physically impaired infant.

Interactive Nature of Development

Two models of development have been proposed by Sameroff and Chandler (1975)--the medical and the interactive model. In the medical model, a particular biological event (e.g., a trauma) is thought to appear as a developmental dysfunction independent of environmental influences. In the interactive model, the particular trauma is thought to interact with the environment to produce specific developmental dysfunction.

The assumption that developmental dysfunction is the outcome of interaction between an early biological event or trauma and the infant's social and physical environment is reflected in the very nature of our Institute. Both the Research and Detection Units focus on variables in the child's social environment which might affect this development. Common patterns in the social environment of infants with certain handicapping conditions are noted.

The interactive model is also evident in our intervention techniques. Indeed, the goal of our intervention is to restructure the environment in a way which will facilitate development by compensating for the infant's basic deficit, be it motor or cognitive.

B. STRUCTURE, GOALS AND FUNCTIONS OF THE INSTITUTE

Achievement of the goals of the Institute is predicated not only upon the five theoretical principles of development but also upon the Institute's organizational structure. The Institute is comprised of four units which reflect the transdisciplinary approach; these are the Detection Unit, the Research Unit, the Intervention/Evaluation Unit, and the Training/Dissemination Unit.

These units and their relationship to the overall goals and functions of the Institute are briefly described in the following section.

Detection Unit

Two of the major goals of the Institute--development of more effective techniques for early identification of children at-risk for developmental dysfunction and design of broader and more sensitive assessment tools to be used with known handicapped children--are being addressed by the Detection Unit. Subsumed within the Detection Unit are three projects: the Identification Project, the Premature Infant Followup Project, and the Competency Assessment Project.

The Identification Project entails intensive study of a longitudinal sample of normal infants and infants identified during the neonatal period as at-risk for developmental dysfunction. The children will be followed from birth through early school years and will be assessed in terms of five areas of development--neurological, medical, socioemotional, perceptual-cognitive, and communicative. This study is being conducted at The Roosevelt Hospital site of the Institute. The major aims of the project include identification of measures and procedures which distinguish between normal and at-risk infants, adaptation of standard infant assessment measures for testing of at-risk infants, and determination of the relationship between aspects of early development and later functioning.

The Premature Infant Followup Project involves testing infants who had respiratory distress (RDS) at birth and who were premature. This testing took place when the infants were 12 to 18 months of age in order to predict developmental outcomes of prematurity.

The Competency Assessment Project is a research/demonstration project focusing on the development and assessment of young infants with known physical and/or intellectual handicaps. This project has been engaged in three major activities:

(1) development of the Competency Assessment Profile--a battery of assessment tools designed to measure the skills of handicapped infants across the cognitive, socioemotional and communicative domains,

(2) collection of a substantial body of new data about the functioning and development of handicapped infants within the 3 above-named domains, and

(3) development of new intervention strategies for handicapped infants based upon the CAP battery and the basic research information gathered.

A large sample of infants, age 3-36 months, with known handicaps—Down's syndrome, physical impairment, developmental delays, and multiple handicaps—has been studied in this project. Assessment measures used are both standard infant assessment measures and measures initially developed for basic research, now being examined for their clinical applications. Data collection for the Competency Assessment Project was carried out "in the field"—at infant stimulation programs in New York and New Jersey, but was based at the ETS Infant Laboratory site of the Institute.

Research Unit

The Research Unit addresses another of the major goals of the Institute: the collection of a body of information on the development of normal, handicapped and at-risk infant populations. This body of research data is critical to development of more effective detection and intervention strategies. Two research projects are included within this unit. Both are being carried out at ETS. The first is the Contingency Research Project which is investigating the effectiveness of contingency procedures in helping infants to learn. The second is the Pilot Research Project, a series of small scale studies using traditional research methodologies to examine handicapped infants' social, emotional, and communicative development.

Intervention/Evaluation Unit

This unit addresses the need for more effective techniques for early intervention with handicapped and at-risk infants. This unit will also carry out systematic evaluation of the intervention techniques developed. The unit is comprised of three projects—the Contingency Intervention Project, the Study of Communicative Development of Moderately and Severely Handicapped Preschool Children, and the Evaluation Project.

The purpose of the Contingency Intervention Project is to facilitate handicapped infants' development through a "learning to learn" strategy which focuses on developing cognitive processes rather than specific skills. The premise underlying this "learning to learn" strategy is that cognitive, social, motor, and communicative development is most effectively facilitated by an environment which gives a child reinforcement for even the smallest action or behavior and thus develops a sense of mastery and motivation to continue interacting with the environment. A social contingency program is being developed to train teachers, parents, and other "social objects" to interact contingently with the infant.

The purpose of the Study of Communicative Development of Moderately and Severely Handicapped Preschool Children concerns the developmental structure of various communicative behaviors. An observational instrument (Brinker & Goldbart, 1981) designed to categorize gestures, vocalizations, and verbalizations in terms of pragmatic and semantic functions will be used.

The Evaluation Project measures the relationship between handicapped infants' development and the child's larger environment, the effectiveness of the educational intervention techniques developed, and the effectiveness of all the major research programs and educational products of the Institute.

Products/Training/Dissemination Unit

This unit addresses the dissemination function of the Institute—making the information gathered and educational and intervention techniques developed in the course of the Institute's work available to professionals working with handicapped and at-risk populations. Products expected to emerge from the endeavors of the Institute include the Competency Assessment Profile and the curriculum techniques developed in the Intervention Unit—including contingency-based educational toys.

Dissemination of information and techniques developed in the course of the Institute's work has been and will be conducted through workshops and training sessions held at both ETS and Roosevelt Hospital sites. These will be for teachers, infant program administrators, other professionals working with handicapped populations, as well as parents of handicapped children.

In the Predoctoral and Postdoctoral Training Programs, pre- and postdoctoral fellows are being given research, assessment, and intervention skills to further their careers in working with young handicapped children.

C. THE PRIORITIES OF THE INSTITUTE

The most unique aspect of the Institute for the Study of Exceptional Children is the "marriage" of a research and a primary health care institution. This relationship facilitates more effective and productive communication between medical and research institutions and thus insures more rapid application of research information for detection and intervention purposes. This cooperative effort also insures more complete dissemination of research information to those "in the field," working directly with handicapped children.

The Institute also addresses four general areas of concern. First, it speaks to the need for more effective means of documenting educational intervention methods. The work of the Intervention-Evaluation Unit will include examination of the "learning to learn" curriculum techniques devised by the Institute, as well as characterization of other, existing intervention methods in terms of their use of contingent (action-outcome) experiences to facilitate cognitive and social development. Documentation of the effectiveness of the Institute's intervention techniques are carried out using the Competency Assessment Profile to measure progress of individual children and also to collect group data. The Competency Assessment Profile will also be used to evaluate a number of other intervention environments, e.g., hospital programs, home-based programs, etc.

The second general area of concern—description of the handicapped child's larger environment—is addressed in two ways. The Competency Assessment Profile to be implemented through the Detection Unit includes several measures which tap aspects of the child's environment: Infant Laboratory mother-infant interaction scale, a Parent Attitude Questionnaire and an instrument which notes the child's interaction with his social environment—the Lewis-Michalson Socioemotional Scales of Development. Through the Institute's Intervention Unit, observation of the aspects of different infant program environments which appear to affect an infant's behavior and development are made. Further, continual, detailed record-keeping facilitate analysis of the effects of the Institue's modifications of the infant's social and physical environment via its contingency-based "learning to learn" curriculum techniques.

The third issue-description of child characteristics--is addressed by both the Research and Detection Units. The Competency Assessment Profile and other research instruments facilitate collection of group and individual data on children's strengths and weaknesses, as well as the interaction of skills in development. The information collected through the endeavors of both units will facilitate construction of curriculum techniques appropriate to children with different patterns of skills at one point in time but will also have a predictive component--measuring the relationship between certain child characteristics and skill profiles in the very early years with developmental patterns over time.

The fourth area concerns the documentation of child progress. The goal of improving methods of documenting child characteristics is closely related to the task of improving methods of describing child progress. The assessment and identification projects give measures on a full range of skills within the major domains of development. Thus, it is possible to make an initial evaluation of a child which is both thorough and highly descriptive. The profile of the child's skills can then be used as a basis to plot the child's progress. By repeated assessments, update profiles are obtained, giving equally extensive information on the child at later points in time. A multitude of comparisons can be made from these profiles and the child's progress can be appraised with great specificity.

Our identification and assessment techniques permit us to measure the progress of children who, because of the nature or severity of their handicapping conditions, have been difficult to assess using existing techniques.

IV. INSTITUTE MISSION, OBJECTIVES, AND ACTIVITIES

A. THE FOUR GOALS OF THE INSTITUTE

The Institute for the Study of Exceptional Children has been formed with the express purpose of improving the lives of young children who are handicapped or are at risk for handicapping conditions. Our goals, as we see them, are to identify such children, assess their social, emotional, and cognitive functioning, intervene in their lives through the development of novel intervention strategies, and train professionals in an interdisciplinary setting in identification, assessment, and intervention. To this end, an interdisciplinary team of professionals has been formed under the auspices of Educational Testing Service, with centers in the Pediatric Service of Roosevelt Hospital (New York) and in the Infant Laboratory of Educational Testing Service (Princeton, New Jersey).

The importance of these four Institute goals--identification, assessment, intervention and training--is illustrated by the following examples.

Identification

> Sharon S. is an attractive baby. At two weeks she sleeps a great deal of the time and is not at all fussy. She eats well and is a soft and cuddly infant. Her parents report she is a "good baby." By one month of age she still sleeps well, almost too much since her mother reports it is difficult to wake her; she sometimes sleeps through a feeding. When awake she does not seem terribly interested in objects around her; there is still little eye coordination and when placed in a sitting position she shows little head holding. Placing her on her stomach there is some ability to lift her head. She is still a "good baby" but her parents are a bit concerned about her deep sleeping and lack of interest in her environment.

Sharon S. is at risk for later social, emotional, and cognitive dysfunction. Her delivery was difficult; her mother was heavily medicated. She may continue to be listless, show relatively little attention to her environment, and reach developmental milestones late. This is especially likely if her parents are given no emotional support in terms of their child's lack of interest or explicit instructions in how to increase her interest in her surroundings. Had Sharon S. been given an early detection battery, her at risk condition could have been identified, and her parents (through participation in some type of intervention) might have been able to understand their child better, to supply the social and emotional support necessary, and to provide the necessary training in order to counteract the deleterious effects of the initial dysfunction. Without early identification, Sharon S.'s original inability to interact effectively with her social or nonsocial environment will be compounded, resulting in greater dysfunction.

Assessment

> Johnny H. is identified soon after birth as having Down's Syndrome. His parents are advised by their pediatrician that their child will never be able to do any more than basic self-care routines, if that. Therefore, the parents believe that their child will be institutionalized some day, although they do enroll him in an infant stimulation program on the advice of the public health nurse. A teacher in Johnny's program notices that he

is quite alert and attentive. Knowing that Down's Syndrome children vary greatly in many skill areas the teacher begins a rigorous intervention program which is extremely successful. In addition, the parents, seeing Johnny's progress, become more interested in him, spend more time with him and try some of the teacher's training techniques at home. Johnny's progress becomes even more pronounced, much to everyone's delight.

This example suggests that the relationship of behavioral skill and handicapping condition is much more complex than previously thought and that a total picture of development in the handicapped infant is desperately needed, in order to make educational intervention more effective.

Training

Janet L., a pediatric resident, is examining Sheila, a one-year-old infant who is sitting on the end of the table. Her parents have reported their uneasy feelings about Sheila's health; "she appears somewhat restless," they report, although Dr. L. sees a "healthy" baby. Had the pediatrician received training in child development and "at risk"evaluation, she might have been able to spot the early manifestations of a later handicapping problem. Had Dr. L. known to look at Sheila's sensory-motor development, for example, by examining Sheila's "object permanence" ability, she would have discovered that the baby was functioning at a seven-month level. Unfortunately, very little of the course work or practicum in medical school and residency was devoted to this type of developmental evaluation.

Norman H., an Ed.D., has spent the last two years working in a center for Down's Syndrome infants. Dr. H. has been working with the parents of Down's Syndrome children, teaching them what to expect from their children and what to do at home. In the course of working with parents and children, he has noticed sharp individual differences within the category of Down's Syndrome. As he studies his records on two 12-month infants, one of whom is making significant progress while the other remains significantly retarded in development, Dr. H. wonders about the medical history of these children and what biological factors might play a role in the differences he observes. Unfortunately, Dr. H.'s training has not provided him with sufficient information about the various biological and medical complications associated with different syndromes. He has had almost no training in the area of pediatric medicine. Because of the inadequacy of training in certain areas, he is unable to test the biological versus learning hypothesis he has generated.

These examples of two highly educated individuals in two different specialties illustrate the failure of existing educational programs in pediatrics, child psychology and special education to include and integrate all three areas of knowledge critical to the diagnosis and treatment of handicapped children. Effective treatment of the handicapped child must respond not only to the child's primary impairment--whether physical or mental--but to all the other problems which result from and/or interact with the primary impairment--difficulties in the emotional realm, learning deficits, defective interaction with the social world, etc.

In other words, the problems of the handicapped child and his family cut across the medical, psychological and educational domains and consequently must be dealt with from an interdisciplinary perspective.

Intervention

> Dennis is a one-year-old child with Down's Syndrome. While Dennis is in generally good physical health, his intellectual and language development is delayed, his response time is slow, and his parents are often frustrated by the amount of time and repetition involved in getting a response from Dennis. Unlike the more responsive and reactive normal infant, Dennis showed little imitation of body gestures during the first weeks and months of life. Thus, his parents have never experienced, along with Dennis, a game of mutual imitation, and the fun of such play. Now, with their son a year old, Dennis' parents have little motivation to wait for an imitative response, or engage in a peek-a-boo game in which they still must place his hand to hide his face. Dennis has not shown any initiation of gestural games. Although he does produce some simple, imitative responses like waving good-bye, neither Dennis nor his parents have developed an effective communicative system, social interaction, or a satisfying parent-child game with social imitative behaviors.

This illustrates the importance of social interaction and skill mastery in the infant's progress, even within an intervention program. Unless the infant can learn that behavior has an effect on the environment, both social and non-social, intervention may be of little value. The infant does not passively receive information, but must actively interact with his world in order to learn. Therefore, intervention programs must include manipulanda for encouraging parent-child reciprocal interaction as well as encouraging object-child reciprocal interaction.

B. ACTIVITIES

The accomplishments of the Institute during each of the 5 years of its existance are documented in the following tables. The publications and presentations resulting from this work are listed in Chapter VII: Products.

Table 1

Activities Conducted in Year 1

Function	Activity	Time
Administrative	Hired Dr. Nathan Fox, Ph.D., Detection Unit Coordinator	Fall, 1977
	Hired Ms. Aileen Wehren, M.A., as Research Assistant	Fall, 1977
	Hired Ms. Dulce Urena, B.A., as Community Health Care Worker	Spring, 1978
	Interviewed Intervention Unit Coordinator Candidates	Spring, 1978
	Interviewed Post-doctoral Candidates	Spring, 1978
	Advisory Board Meeting	Winter, 1978
	Communication Network between Centers	Fall, 1977
Grant Writing	"Interdisciplinary Training in the Education of the Handicapped"	Fall, 1977
	"Attentional Deficiencies in Infants with Down's Syndrome"	Fall, 1977
	"Developmental Study of Communication Network of Handicapped Infants and Prime Caretakers"	Fall, 1977
	"Social Imitation and Curriculum Development with Handicapped Infants"	Fall, 1977
Paper Presentations and Conferences	Arranged and Submitted Workshop on "Issues in Social and Cognitive Assessment with Handicapped Infants," Conference on Infant Studies meeting, Providence, Rhode Island, March, 1978. Members of all four Institutes participated. Dr. Michael Lewis, Chairman of the Workshop Dr. Jeanne Brooks-Gunn, Participant in the Workshop	Spring, 1978
	Shapiro, J., & Brooks, J. Temperament characteristics of handicapped infants. Paper presented at the Eastern Psychological Association meetings, Washington, D. C., March, 1978.	Spring, 1978
	Hawryluk, M. K., & Lewis, M. Attentional patterns in infants with Down's Syndrome: A preliminary investigation. Paper presented at the Eastern Psychological Association meetings, Washington, D. C., March, 1978.	Spring, 1978
	Brooks, J. Attentional processes in the handicapped infant: Implications for intervention. Workshop presented at the New Jersey Symposium, Rutgers University, March, 1978.	Spring, 1978
	Lewis, M. Perceptual-cognitive dysfunction in the newborn. Grand Rounds presentation, Harlem Hospital, New York, February, 1978.	Winter, 1978

	Lewis, M. Five developmental principles and their relationship to special education. Presentation at a Project Upreach conference of the New Jersey Educational Improvement Center, Middlesex (New Jersey) County Community College, February, 1978.	Winter, 1978
	Lewis, M. Intervention in the lives of handicapped children. New Jersey Focus, WOR-TV, New York. March, 1978.	Winter, 1978
	Lewis, M. New methods of assessment. In-service Training Meeting, Willingboro (New Jersey) School District Department of Special Services, Willingboro, New Jersey, April, 1978.	Spring, 1978
	Lewis, M. Social development and its relationship to dysfunction. Presentation to Special Services Division, Community Mental Health Department, Hahnemann Hospital, Philadelphia, Pa., April, 1978.	Spring, 1978
	Lewis, M. Five development principles and their relationship to education of the handicapped. Seminar presentation, Educational Testing Service, Princeton, N.J., April, 1978.	Spring, 1978
	Lewis, M. Five developmental principles and their relationship to special education. Presentation to a meeting of the Department of Special Education, Paterson College (New Jersey), April, 1978.	Spring, 1978
Detection Unit-Identification Project	Literature Review: "The Use of Infant Tests for Prediction of Childhood Intelligence." by Dr. Nathan Fox	Winter, 1978
	Literature Reveiw: "Infants 'At Risk': The Consequences of Low Birth Weight on the Physical and Mental Health of the Child." by Dr. Nathan Fox	Winter, 1978
	Designed and began building Infant Laboratory at Roosevelt Hospital, New York	Winter, 1978
	Designed measures to be used in Identification Project	Winter, 1978
	Interviewed candidates for positions	Winter, 1978
Detection Unit-Competency Assessment Project	Tested 50 handicapped infants in New Jersey with Assessment Battery	
	Prepared Program Feedback for Battery	
	Prepared Individual Profiles for programs	
Research Unit	Literature Review: "The Development of Social Knowledge: Implications for Handicapped Infants." by Dr. Jeanne Brooks-Gunn	Winter, 1978
	Literature Review: "Attention in Infancy." by Dr. Gordon Hale	Winter, 197

	Prepared three grant proposals	Fall, 1977
	Designed Contingency Research Project	Winter, 1978
Intervention-Evaluation Unit	Literature Review: "A Review of Contingency in Infancy: Avenues for the Handicapped Infant." by Dr. S. Kenneth Thurman	Fall, 1977
	Designed Contingency Intervention Project	Fall, 1977
	Began design on contingency machines	Winter, 1978
Products, Dissemination, Training Unit	Prepared grant proposal for training	Fall, 1977
	Interviewed pre-doctoral candidates	Spring, 1978

Table 2

Activities Conducted in Year 2

Function	Activity	Time
Administrative	Hired Dr. Marci Hanson, Ph.D., Intervention Unit Coordinator	Summer, 1978
	Hired Ms. Pam Ritter, Research Assistant	Summer, 1978
	Hired Mr. Herb Mertz, Research Assistant	Winter, 1979
	Hired Ms. Agatha Jarvis, Research Assistant	Fall, 1978
	Hired Ms. Lucy Velez, Secretary/Community Worker	Fall, 1978
	Hired Ms. Wendy Ehrenkranz, Research Assistant	Fall, 1978
	Hired Ms. Ann Wilk, Administrative Assistant	Fall, 1978
	Selected four predoctoral fellows for Year 2	Summer, 1978
	Interviewed predoctoral fellows for Year 3	Spring, 1979
	Advisory Board meeting	Spring, 1979
	Introduced Premature Infant Followup Project	Winter, 1979
	Introduced Infant Attention Project	Winter, 1979
Grants Funded	"Skill Development in the Handicapped Infant"	Summer, 1978
	"Fear of the Strange: Normal and Atypical Development"	Winter, 1979
	"An Examination of Maternal Linguistic Strategies"	Spring, 1979
	"Premature Infant Followup Project"	Winter, 1979
	"Young Handicapped Children: Policy Directions for New Jersey"	Winter, 1979
Grants Submitted	"The Opening Years of Life: Normal and Atypical Development"	Spring, 1979
	"Infant Learning and Parent Feedback Systems Using Microcomputer Technology"	Spring, 1979
Detection Unit-Identification Project	Building of Infant Laboratory at Roosevelt Hospital	Spring, 1979
	Pretested all neonatal measures	Fall, 1978
	Tested 60 neonates	Winter, 1979
	Organized Pediatric Resident Seminar Program	Summer, 1978
	Prepared Handbook for Families	Fall, 1978

Detection Unit-	Pretested all 3-month measures.	Winter, 1979
	Began data collection on 3-month-olds.	Winter, 1979
Competency Assessment Project	Assessment of handicapped infants.	Winter, 1979
	Pretested measures with auditory-impaired infants.	Winter, 1979
	Began data reduction.	Spring, 1979
	Preliminary data analysis.	Summer, 1979
	Prepared program feedback for Battery.	Summer, 1979
	Prepared individual profiles for programs.	Summer, 1979
Detection Unit-Premature Infant Followup Project	Designed project.	Winter, 1979
	Pretested measures.	Winter, 1979
	Designed equipment.	Winter, 1979
	Began data collection.	Spring, 1979
Research Unit-Pilot Research Projects	Designed four studies.	Fall, 1978
	Pretested measures.	Winter, 1979
	Began data collection.	Winter, 1979
	Completed data collection.	Summer, 1979
Research Unit-Contingency Research Project	Designed two studies.	Fall, 1978
	Built equipment.	Fall, 1978
	Pretested procedure.	Winter, 1979
	Completed data collection for Study 1.	Spring, 1979
	Began data analysis for Study 1.	Summer, 1979
Research Unit-Infant Attention Project	Designed two studies.	Fall, 1978
	Built equipment.	Winter, 1978
	Pretested procedures.	Winter, 1979
	Began data collection.	Spring, 1979
Intervention Unit-Contingency Intervention Project	Hired engineer consultant.	Fall, 1978
	Designed contingency equipment.	Fall, 1978
	Began building equipment.	Winter, 1979
	Began identification of subjects.	Winter, 1979
	Began subjects in intervention.	Winter, 1979
	Continue implementation of intervention.	Spring & Summer, 1979
	Complete subject identification.	Spring, 1979
	Complete building of first apparatus.	Spring, 1979
	Write draft of contingency curriculum.	Summer, 1979

Training Unit-Predoctoral Training Project	Selected predoctoral fellows.	Summer, 1978
	Designed predoctoral program.	Fall, 1979
	Conducted professional seminar series.	Winter & Spring, 1979
	Conducted Institute seminar series.	Fall, 1979
	Designed & conducted studies (see Pilot Research Project).	Winter & Spring, 1979
Training Unit-Dissemination Activities	Contributed to the Cross-Institute newsletter.	Winter & Spring, 1979
	Provided technical assistance regionally.	Fall, 1978 - Summer, 1979
	Organized New Jersey Infant Care Policy conference (to be held in Princeton, N. J., May 1979)	Winter & Spring, 1979
	Organized Sumposium on Developmental Disabilities in the Preschool Child (to be held in Chicago, September 1979).	Summer, 1979
	Sponsored Conference on The Genesis of Behavior: The Uncommon Child, (Princeton, N. J., March 1979).	Spring, 1979

Table 3

Activities Conducted in Year 3

Function	Activity	Time
Administration		
Intervention Unit	Conducted national search for candidates	Summer, 1979
	Interviewed candidates	Summer, 1979
	Hired Dr. Richard P. Brinker as Coordinator of Intervention Unit	Summer, 1979
Pre-Doctoral Program	Interviewed candidates	Summer, 1979
	Chose four predoctoral fellows: Katherine Gerrity Barbara Gsovski Lucille Weistuch Christian Miner	Fall, 1979
Post-Doctoral Program	Chose three postdoctoral fellows: Dr. Lauren Abbe Dr. Saul Feinman Dr. Jane Leifer	Fall, 1979
Hiring of Research Staff	Hired Ms. Sharon Gerber, Research Assistant	Fall, 1979
	Hired Ms. Elizabeth Hartka, Research Assistant	Summer, 1979
	Hired Mr. John Jaskir, Research Assistant	Summer, 1979
	Hired Ms. April Lamendola, Secretary	Fall, 1979
	Hired Ms. Annie Hernandez, Research Assistant	Spring, 1979
	Hired Ms. Louise Tubio-Cid, Research Assistant	Summer, 1979
	Hired Ms. Jeannette Diaz, Secretary	Fall, 1979
Hiring of Programmer	Hired Mr. Kenneth Provencher, Research Assistant	Fall, 1979
Advisory Board	Planned meeting at ETS	Winter, 1980
	Held meeting at ETS	Winter, 1980
	Planned meeting at The Roosevelt Hospital	Winter, 1980
Site Visits	Planned site visits	Fall, 1979
	Site visit by Dr. James Hamilton	Fall, 1979
	Site visit by Dr. Garry McDaniels	Fall, 1979

Table 3 (continued)

Function	Activity	Time
Grants Submitted	"Development of Affect and Cerebral Assymmetry in Infants"	Fall, 1979
	"Infant Learning and Parent Feedback Systems Using Microcomputer Technology"	Spring, 1979
	"The Opening Years of Life: Normal, At-risk and Handicapped Development"	Winter, 1980
	"Evaluation of the Integration of Severely Handicapped Children into Regular Classrooms"	Winter, 1980
	"Family Interaction and Cognitive Development"	Fall, 1979
	"A Longitudinal Study of Young Handicapped Children"	Fall, 1979
	"Longitudinal Study of Social and Cognitive Development: Birth Through Six"	Winter, 1980
Grants Funded	"A Cross-Cultural Study of Mother-Infant Interaction"	Spring, 1979
	"Fear of the Strange"	Spring, 1979
	"Premature Infant Followup Project"	Winter, 1979
	"Skill Development in the Handicapped Infant"	Summer, 1979
	"Young Handicapped Children: Policy Directions for New Jersey"	Summer, 1979
	"An Examination of Maternal Linguistic Strategies"	Spring, 1979
Detection Unit-Identification Project	Building of Infant Laboratory at The Roosevelt Hospital	Spring, 1979
	Completion of Infant Laboratory	Spring, 1979
	Equipment for Infant Laboratory build	Spring, 1979
	Equipment for Infant Laboratory installed	Spring, 1979
	Pre-testing of research measures for 8-month, 12-month, and 18-month old infants	Summer, 1979
	Tested 80 neonates	Fall, 1979
	Tested 50 3-month-old infants	Fall, 1979

Table 3 (continued)

Function	Activity	Time
	Tested 50 8-month-old infants	Spring, 1980
	Tested 50 12-month-old infants	Spring, 1980
	On line interactive terminal installed and up for use	Fall, 1979
	Prepared procedures and instruction manual for coding of data	Fall, 1979
	Building second Infant Laboratory at St. Luke's Hospital - Columbia	Winter, 1979
	Completion of second Infant Laboratory at St. Luke's Hospital	Winter, 1979
	Testing of infants at St. Luke's Hospital	Spring & Summer 1979
	Preliminary analyses begun	Fall, 1979
Detection Unit-Competency Assessment Project	Completed assessment of handicapped infants	Spring, 1979
	Completed coding of data	Summer, 1979
	Prepared program feedback for battery	Summer, 1979
	Prepared individual profiles for programs	Summer, 1979
	Conducted data analysis	Fall, 1979 & Winter, 1980
	Planning of Assessment Handbook	Fall, 1979
	Writing of preliminary draft of Assessment Handbook	Winter, 1980
Detection Unit-Premature Infant Followup	Completion of data collection	Spring, 1979
	Design of data coding	Summer, 1979
	Coding of data	Fall, 1979
	Preliminary data analysis	Winter, 1980
Research Unit-Pilot Research Projects	Designed four new studies	Fall, 1979
	Pretested measures	Fall, 1979
	Began data collection	Fall, 1979
	Completed data collection on three earlier studies	Winter, 1980

Table 3 (continued)

Function	Activity	Time
Research Unit-Contingency Research Project	Study 1: Contingency Learning in 10-week-old Infants	
	Design	Spring, 1979
	Pretesting of Infants	Summer, 1979
	Data collection	Fall, 1979
	Coding of data	Winter, 1980
	Preliminary data analysis	Winter, 1980
	Study 2: Contingency Learning in Premature Infants	
	Design	Summer, 1979
	Pretesting of infants	Fall, 1979
	Data collection	Fall, 1979
	Preliminary data analysis	Winter, 1980
	Study 3: Contingency Learning in 16- and 24-week-old Infants	
	Design	Fall, 1979
	Pretesting of infants	Winter, 1980
	Data collection	Winter, 1980
	Study 4: Contingency and Affect at One Year of Age	
	Design	Winter, 1980
	Pretesting of infants	Winter, 1980
	Data collection	Summer, 1980
Research Unit-Infant Attention Project	Study 1: Comparison of Fixed Trial Number and Criterion Techniques in Habituation Assessment	
	Design of study	Winter, 1979
	Pretesting of subjects	Spring, 1979
	Testing of subjects	Spring, 1979
	Data analysis	Summer, 1979

Table 3 (continued)

Function	Activity	Time
Research Unit-Infant Attention Project (continued)	Study 2: Developmental Significant of Attention Over the First Five Years of Life	
	Design of study	Winter, 1980
	Study 3: Visual Attention in Premature Infants	
	Design of study	Fall, 1979
	Pretesting of subjects	Fall, 1979
	Testing of subjects	Fall, 1979
	Preliminary data analysis	Winter, 1980
Intervention Unit-Contingency Intervention Project	Design and build several apparatus for intervention with handicapped infants	Spring & Summer, 1979
	Pretest apparatus	Fall, 1979
	Select subjects	Fall, 1979
	Begin testing subjects	Fall & Winter, 1980
Intervention Unit-Products Development Project	Design immediate feedback system for parents using a microcomputer	Spring, 1979
	Pretest equipment and modify design	Summer & Fall, 1979
	Test subjects	Fall & Winter, 1980
	Evaluate feedback system	Winter, 1980
Intervention Unit-Communicative Development Project	Design study	Winter, 1980
	Begin training testers in use of coding system	Winter, 1980
Training Unit-Predoctoral and Postdoctoral	Selected predoctoral fellows	Summer, 1979
	Selected postdoctoral fellows	Summer, 1979
	Designed predoctoral and postdoctoral programs	Fall, 1979
	Conducted professional seminar series	Fall, 1979 & Winter, 1980
	Conducted Institute seminar series	Fall, 1979 & Winter, 1980
	Designed and conducted four studies (see Pilot Research Projects)	

Table 3 (continued)

Function	Activity	Time
Training Unit-Dissemination Activities	Provided technical assistance regionally	Spring, 1979- Winter, 1980
	Held New Jersey Infant Care Policy Conference	Spring, 1979
	Held Symposium on Developmental Disabilities in the Preschool Child	Fall, 1979
	Held Conference on The Genesis of Behavior: The Uncommon Child	Spring, 1979
	Attended professional conferences	Spring, 1979- Spring, 1980
	Prepared research papers, monographs, chapters, and books	Spring, 1979- Spring, 1980
Literature Reviews	"Principles of early development: The exceptional infant" Michael Lewis and Jeanne Brooks-Gunn	Spring, 1980
	"Identifying the exceptional infant" Jeanne Brooks-Gunn and Michael Lewis	Spring, 1980
	"Assessing the exceptional infant" Jeanne Brooks-Gunn and Michael Lewis	Spring, 1980
	"The emotional development of the exceptional infant" Michael Lewis and Jeanne Brooks-Gunn	Summer, 1980
	"Intelligence testing and the exceptional infant" Jeanne Brooks-Gunn and Michael Lewis	Summer, 1980
	"Motivational factors and the development of the exceptional infant" Michael Lewis and Jeanne Brooks-Gunn	Summer, 1980

Table 4

Activities Conducted in Year 4

Function	Activity	Time
Administration		
Intervention Unit	Interviewed candidates	Summer 1980
	Hired:	Summer 1980
	Margaret Thorpe as Coordinator of Data Collection	
Predoctoral Program	Interviewed candidates	Summer 1980
	Chose predoctoral fellows	Fall 1980
	Margaret Bendersky	
	Carolyn McGuffog	
	Lauren Brandt	
	Marion Stoltz-Loike	
Post-Doctoral Program	Interviewed candidates	Summer 1980
	Chose postdoctoral fellows	Fall 1980
	Dr. Miriam Kotsonis	
	Dr. Linda Michalson	
Hiring of Research Staff	Hired Joyce Gant, Research Assistant	Fall 1980
	Hired Margaret Sullivan, Senior Research Assistant	Fall 1980
	Hired Linda Wellman, Research Assistant	Fall 1980
	Hired Kathleen Gray, Secretary	Winter 1981
Grants Submitted	"Prelinguistic Mother-Infant Communicative Exchanges"	Winter 1981
	"A Comparative Study of Speech to Prelinguistic Handicapped Infants"	Spring 1981
	"Family Interaction and Cognitive Development"	Spring 1981
	"Assessment of Preschool Handicapped Children: A Longitudinal Evaluation"	Winter 1981
	"Coping and Stress in 6-Year-Old Children: A Longitudinal Perspective"	Winter 1981

Table 4 (con't)

Function	Activity	Time
Grants Funded	"The Opening Years of Life: Normal, At-Risk and Handicapped Development"	Summer 1980
	"Evaluation of the Integration of Severely Handicapped Children into Regular Classrooms"	Spring 1980
Detection Unit - Identification Project	Testing of 12 month olds	Spring 1980
	Testing of 24 month olds	Summer & Fall 1980
	Data coded	Spring & Summer 1980
	Analysis of attention data	Summer 1980
	Analysis of manual asymmetry data	Fall 1980
	Planning of 36 month measures	Summer 1980
	Analysis of dichotic listening data	Fall 1980
	Analysis of sensory integration data	Fall 1980
	Dissemination of results	Ongoing
	Data Analysis	Ongoing
Detection Unit - Competency Assessment Project	Prepared feedback to infant programs	Summer 1980
	Conducted data analysis	Spring, Summer & Fall 1980
	Training of program staff in use of Battery	Summer 1980
	Revision of Battery to program staff	Fall 1980
	Preparation of Assessment Handbook	Fall 1980 & Winter 1981
	Dissemination of results	Ongoiong
Detection Unit - Premature Infant Follow-up	Conducted data analysis	Summer 1980 & Fall 1980
	Dissemination of results	Ongoing
Research Unit - Contingency Research Project	Study 1: Contingency Learning in 10-week-old Infants	
	Conducted data analysis	Spring 1980
	Planning of further research Based upon results	Spring 1980
	Dissemination of results	Ongoing

Table 4 (con't)

Function	Activity	Time
	Study 2: Contingency Learning in Premature Infants	
	Conducted data analysis	Spring 1980
	Design of additional research	Spring 1980
	Dissemination of results	Ongoing
	Study 3: Contingency Learning in 16- and 24-Week-Old Infants	
	Data collection completed	Spring 1980
	Data analysis conducted	Summer 1980
	Additional research designed	Summer 1980
	Dissemination of results	Ongoing
	Study 4: Contingency Learning, Affect and Arousal in One-Year-Old Infants	
	Data collection completed	Fall 1980
	Data analysis conducted	Winter 1980
	Additional research designed	Winter 1980
	Dissemination of results	Ongoing
	Study 5: Contingency Research With Handicapped and At-Risk Infants	
	Design of study	Fall 1980
	Pretesting of infants	Winter 1981
	Data collection	Winter 1981
	Dissemination of results	Ongoing
Research Unit - Pilot Research Projects	Designed eight new studies	Fall 1980
	Pretested measures	Fall 1980
	Data collection	Winter 1981
	Preliminary data analysis	Winter 1981
	Dissemination of results	Ongoing
Research Unit - Infant Attention	Study 1: Comparison of Fixed Trial Number and Criterion Techniques in Habituation Assessment	
	Data analysis completed	Spring 1980
	Results disseminated	Summer 1980 Ongoing

Table 4 (con't)

Function	Activity	Time
	Study 2: The Contribution of Several Infant Characteristics in Maternal-Infant Interaction at 3 Months	
	Study designed	Fall 1980
	Data coded	
	Data analysis begun	Winter 1981
	Dissemination of results	Ongoing
	Study 3: Visual Attention in Premature Infants: Preliminary Report on the Effects of Stimulus and Risk Status	
	Data analysis	Spring 1980
	Dissemination	Summer 1980 Ongoing
Intervention Unit - Contingency Intervention Project	Data collection with two samples	Summer & Fall 1980
	Data analysis	Fall 1980 & Winter 1981
	Interface with Contingency Research Project made	Winter 1981
	Additional Contingency apparatus developed	Fall 1980 & Winter 1981
	Dissemination of results	Ongoing
Intervention Unit - Communicative Development Project	Design of study	Spring 1980
	Data collection procedures developed	Spring 1980
	Coding procedures developed	Fall 1980
	Data collected	Fall 1980
	Data coded	Fall 1980
	Data analyzed	Winter 1981
Training Unit - Predoctoral and Postdoctoral	Selected predoctoral fellows	Summer 1980
	Selected postdoctoral fellows	Summer 1980
	Designed pre- and post-doctoral programs	Fall 1980
	Conducted professional seminar series	Fall 1980 & Winter 1981
	Conducted Institute seminar series	Fall 1980 & Winter 1981

Table 4 (con't)

Function	Activity	Time
	Designed and conducted studies (see Pilot Research Projects)	Fall 1980 & Winter 1981
	Pediatric training	Fall 1980 & Winter 1981
Products Development - Contingency Intervention Technology	APPLE II microcomputer software written	Spring 1980
	Data storage and retrieval systems designed	Spring 1980
	Home use of apparatus field tested	Summer & Fall 1980
	Computer programs documented	Fall 1980
	Dissemination of information about the system	Winter 1981 Ongoing
	System tested in remote field site	Fall 1980 & Winter 1981
Products Development - Competency Assessment Profile	Procedures for test administration prepared	Spring 1980
	Program personnel trained in use of Battery	Summer 1980
	Written procedures revised	Fall 1980
	Handbook prepared	Fall 1980 & Winter 1981
	Dissemination	Ongoing
Products Development - The Opening Years of Life: Normal, At Risk and Handicapped Development	Review of existing films	Fall 1980
	Literature review	Fall 1980
	Assessment of needs of parents and professionals	Fall 1980 & Winter 1981
	Screening of film makers	Fall 1980
	Preliminary script development	Winter 1981
	Procedures for dissemination developed	Winter 1981
Products Development - Developmental Knowledge and Management Practices Scale	Scale revision	Spring 1980
	Statistical analysis - scale properties	Spring 1980
	Dissemination	Ongoing
Products Development - Neurodevelopmental Scale	Scale development and revision	
	Assessment of scale validity	Spring 1980
	Dissemination	Ongoing

Table 4 (con't)

Function	Activity	Time
Dissemination	Provided technical assistance regionally	Spring 1980 - Winter 1981
	Attended professional conferences	Spring 1980 - Winter 1981
	Prepared research papers, monographs, chapters, and books	Spring 1980 - Winter 1981
	Developed dissemination plan for Year 5	Fall 1980 - Winter 1981

Table 5

Activities Conducted in Year 5

Function	Activity	Time
Administration		
Predoctoral Program	Chose predoctoral fellow - Jamie Greene	Fall 1981
Hiring of Research Staff	Hired Lorraine Luciano, Research Assistant	Summer 1981
	Hired Mary Enright, Senior Research Assistant	Summer 1981
	Hired Jim Rosso, Research Assistant	Summer 1981
	Hired Rosemary Diebler, Secretary	Winter 1981
Grants Submitted	"An Intervention System for Handicapped Children Using Microcomputer Technology"	Winter 1981-82
	"A Developmental Study of the interface between Affect and Cognition"	Winter 1981-82
	"The New Brunswick Language Interaction-Intervention Project"	Winter 1981-82
	"The Evaluation of Mandated Infant Education in New Jersey"	Spring 1982
Grants Funded	"Children's Emotions and Moods: Theory and Measurement"	Ongoing
	"The Opening Years of Life: Normal, At-Risk and Handicapped Development"	Ongoing
	"Evaluation of the Integration of Severely Handicapped Children into Regular Classrooms"	Ongoing
Detection Unit - Identification Project	Completed testing of 24 month olds	Spring 1982
	Analysis of three-month data	Winter 1981
	Analysis of eight-month data	Spring 1982
	Analysis of twelve-month data	Summer 1982
	Dissemination of results	Ongoing
	Data Analysis	Ongoing
Detection Unit - Competency Assessment Project	Selection, development, and revision of measures for Preschool Longitudinal Study (CAP Follow-up)	Fall 1981
	Re-location of original CAP subjects	Fall 1981
	Subjects tested	Winter 1981 - Spring 1982
	Preliminary data coding and analysis	Spring 1982

Table 5 (con't)

Function	Activity	Time
	Dissemination of results	Ongoing
Detection Unit - Premature Infant Follow-up	Conducted data analysis	Summer 1981 & Fall 1981
	Preparation of papers	Ongoing
	Dissemination of results	Ongoing
Research Unit - Contingency Research Project	Study 1: Contingency Learning in 10-Week-Old Infants	
	Dissemination of results	Ongoing
	Study 2: Contingency Learning in Premature Infants	
	Dissemination of results	Ongoing
	Study 3: Contingency Learning in 16- and 24-Week-Old Infants	
	Dissemination of results	Ongoing
	Study 4: Facial Affect and Contingency Learning at 6 Months of Age	
	Preliminary data analysis	Spring 1982
	Dissemination of results	Ongoing
	Study 5: Contingency Learning, Affect and Arousal in One-Year-Old Infants	
	Dissemination of results	Ongoing
	Study 6: Longitudinal Contingency Research With Non-Handicapped Infants	
	Preliminary analysis and interface with intervention project	Fall 1981 - Spring 1982
	Dissemination of results	Ongoing
Other Research - Projects	Ten studies by pre and post-doctoral students were completed	Summer 1981 - Spring 1982
	Data analysis completed	Fall 1981 - Winter 1981
	Papers or dissertations written	Spring 1982
	Dissemination of results	Ongoing
Research Unit - Infant Attention	Study 1: Comparison of Fixed Trial Number and Criterion Techniques in Habituation Assessment	
	Results disseminated	Ongoing

Table 5 (con't)

Function	Activity	Time
	Study 2: The Contribution of Several Infant Characteristics in Maternal-Infant Interaction at 3 months	
	Literature review completed	Summer 1981
	Data analysis completed	Winter 1981
	Report written	Spring 1982
	Dissemination of results	Ongoing
	Study 3: Visual Attention in Premature Infants: Preliminary Report on the Effects of Stimulus and Risk Status	
	Data analysis completed	Fall 1981
	Paper written	Spring 1982
	Dissemination of results	Ongoing
Intervention Unit - Contingency Intervention Project	New apparatus tested	Winter 1981 - Spring 1982
	Data from two additional samples collected	Winter 1981 - Spring 1982
	Preliminary analysis of new data	Spring 1982
	Analysis of data from new and old samples combined	Spring 1982
	Dissemination of results	Ongoing
Intervention Unit - Communicative Development Project	Results disseminated	Ongoing
	Conducted professional seminar series and conducted Institute seminar series	Summer 1981 - Spring 1982
Training Unit - Predoctoral and Postdoctoral	Pre- and post-doctoral researches were completed	Fall 1981 - Spring 1982
	Pediatric training	Fall 1981 - Spring 1982
Products Development - Contingency Intervention Technology	APPLE II microcomputer softward updated	Fall 1981
	Data storage and retrieval systems modified	Fall 1981
	New apparatus field tested	Fall 1981 - Winter 1981
	Dissemination of information about the system	Ongoing

Table 5 (con't)

Function	Activity	Time
Products Development - Competency Assessment Profile	Handbook chapters drafted	Summer 1981
	Dissemination	Ongoing
Products Development - The Opening Years of Life: Normal, At Risk and Handicapped Development	Script development	Fall 1981 - Summer 1982
	Filming	Fall 1981 - Winter 1981
	Editing	Spring 1982 - Summer 1982
Products Development - Developmental Knowledge and Management Practices Scale	Dissemination	Ongoing
Products Development - Neurodevelopmental Scale	Dissemination	Ongoing
Dissemination	Provided technical assistance regionally	Summer 1981 - Spring 1982
	Attended professional conferences	Summer 1981 - Spring 1982
	Prepared research papers, monographs, chapters, and books	Summer 1981 - Spring 1982

C. OTHER INSTITUTE RELATED ACTIVITIES

The Institute is involved in a number of activities that need to be specified. These include fund-raising and projects that are part of the Institute but not directly funded by the Bureau for the Education of the Handicapped.

Grants currently funded as well as those currently submitted for review are described next.

Grants Funded

Evaluation of Integrated Educational Services for Severely Handicapped Children/Youth

This project is an effort to identify factors which predict the degree and quality of integration in public school programs for severely handicapped children. Sites have been selected so that there is a range of difference in degrees and quality of integration. We are determining what aspects of state planning, local planning, teacher preparation, parent involvement, and educational processes are predictive of the degree and quality of integration.

The impact of integration will be addressed by determining the extent to which degree and quality of integration is predictive of educational outcome. For the handicapped child, the educational outcomes to be addressed are 1) standardized achievement scores, and 2) attitudes toward handicapped children. For the handicapped child, the educational outcomes include changes in the adaptive behavior of the child in school.

Evaluation sites have been selected in conjunction with BEH appointment of five model programs. Sites have been selected which are in the same geographic region as BEH sites, and which administer a yearly achievement testing program for handicapped children who are integrated. In addition, there are children of comparable ages integrated in BEH and non-BEH evaluation sites. Sites have been selected to provide the widest possible range of differences in state and local planning, teacher preparation, and parent involvement.

The project will be conducted in three phases: 1) site selection (6 months); 2) data collection (18 months); and 3) analysis and dissemination (12 months).

The Opening Years of Life: Normal, At-Risk, and Handicapped Development

The purpose of this project is to create educational media to be used by parents and by professionals who work with parents of young handicapped children. Specifically, current research and applied knowledge about early development in handicapped and normal children will be translated into media materials to serve as educational and training tools for professionals working with young handicapped children and their families and for parents. Two films, two videocassetts, two film strips, and accompanying manuals that illustrate the development of normal and handicapped infants will be developed The films will be appropriate for professionals working with parents and the filmstrips for parents of young handicapped children.

Children's Emotions and Moods

The request for funding was to complete work on a volume entitled, Children's Emotions and Moods: Theory and Measurement. The volume focuses on the development of emotions in the first three years of life, individual differences in emotional expressions, and the measurement of these differences. The book consists of 12 chapters that deal with theoretical issues in the study and measurement of emotions plus a detailed description of an empirical research investigation, the purpose of which was to develop an assessment instrument for measuring the emotional development of infants and young children.

Grants Currently Under Review

The New Brunswick Languate Interaction-Intervention Project

Our pilot research on the maternal speech directed to young language learning children has indicated that mothers of handicapped children utilize a somewhat different response style than do mothers of non-handicapped children even when children are matched for mean length of utterance. This pilot research has further indicated that mothers can be trained to alter their language style and that alteration of the maternal linguistic environment can affect child language growth.

The purpose of this proposal grant, presently under review by the Robert Wood Johnson Foundation, would be to: a) to train physicians to screen for language dysfunction, b) to enroll mothers of children with language dysfunctions in a series of workshops designed to teach them to involve their children in communication and c) to involve the language delayed children in a preschool environment designed to optimize cognitive-linguistic growth

The Evaluation of Mandated Infant Education in New Jersey

The Wagner Bill, law as of December 1981, has mandated that all infants diagnosed as handicapped in the state of New Jersey, be provided with free and appropriate early stimulation. Because this law does not go into effect until September 1983, it will be possible to examine the provision of early intervention pre and post mandate. To this end, we have written a proposal outlining a plan for evaluating the effectiveness of the new state regulations in providing intervention.

The intent of the evaluation would be: a) to measure the change in quantity of services provided to each geographic locale within the state, b) to measure the change in the quality of assessment and program provision within the state, and c) to measure changes in the follow-up transition from infant to preschool services.

An Intervention System for Handicapped Children

The purpose of this project is to develop an intervention program for handicapped infants and their families using micro-computer technology. A sequence of activities (curriculum) will be planned for infants to ameliorate skill deficits and to increase their motivation and competence in interacting with their environment. A major component of the project will involve parent participation in implementing the computer-monitored programs. Thus, visual display systems will be designed for providing feedback on infant behavior to parents using existing computer technology. This display system will be used both for informing parents about child behavior and for determining subsequent intervention strategies.

A Developmental Study of the Interface between Affect and Cognition

This grant is concerned with the analysis of the interrelationship of affect and cognition in a contingency task. The proposal provides for the coding and analysis of facial expression data of 10-, 16- and 52-week old subjects who experienced either contingent or noncontingent stimulation. Analyses of facial change will be conducted with respect to changes in response curves to determine which patterns of arousal and affect are associated with more rapid, efficient learning and how such patterns emerge and change over the first year of life. Such data is likely to have important theoretical and clinical impact for the assessment of early infant competence.

V ADMINISTRATIVE ORGANIZATION

A. THE FOUR UNITS

The Institute is comprised of four units: Detection, Research, Intervention-Evaluation, and Products-Dissemination-Training. These Units were formed in order to address the four goals of the Institute--identification, assessment, intervention, and training--in a way to maximize efficiency as well as interaction. Each of the Units is briefly described below, as well as the interrelationships between each Unit. Figure 1 presents the four Units and the interrelationships among them.

Detection Unit

The Detection Unit of the Institute has two functions: identification of potentially at risk children and assessment of children with known handicaps. Detection has traditionally referred only to identification, even though multidisciplinary and multiskill assessment of handicapped children is essential for detection of strengths and weaknesses and for consequent intervention. Three different projects -- the Identification Project, the Competency Assessment Project, and the Premature Infant Followup Project -- serve to identify those at risk and to assess those with known handicaps.

Research Unit

The Research Unit's functions are to collect normative data using the most up-to-date research methodologies and to develop and refine new research methodologies for detection, assessment, and intervention. Three research projects are included in the Research Unit. The first is the Contingency Research Project which involves systematically testing various questions about the mechanisms and functions of contingency in infancy. Research studies investigate contingency parameters in handicapped infants, with the findings being applied in the Contingency Intervention Project. The second is the Pilot Research Project in which pilot studies on language, imitation, and detection for handicapped and normal infants are conducted. The third, the Infant Attention Project, is investigating various dimensions of early attentional processes.

Intervention-Evaluation Unit

The Intervention-Evaluation Unit's functions are to develop intervention strategies and to evaluate all of the Institute's projects. The unit is comprised of four Projects--the Contingency Intervention Project, the Intervention Products Development Project, the Study of Communicative Development of Moderately and Severely Handicapped Preschool Children, and the Evaluation Project. The purpose of the Contingency Intervention Project is to facilitate handicapped infants' development through a learning to learn strategy. This strategy involves the use of action-outcome pairings, or contingencies, and includes parents, teachers, and manipulanda. The Products Development Project is designed to develop response manipulanda and consequence devices which ultimately can be available for home use, thus extending intervention to the home. The purpose of the Study of Communicative Development is to research and design appropriate parent intervention strategies concerning the development of pragmatic and semantic functions in the language of handicapped children. The Evaluation Project is evaluating all of the Institute Projects in terms of their outcomes.

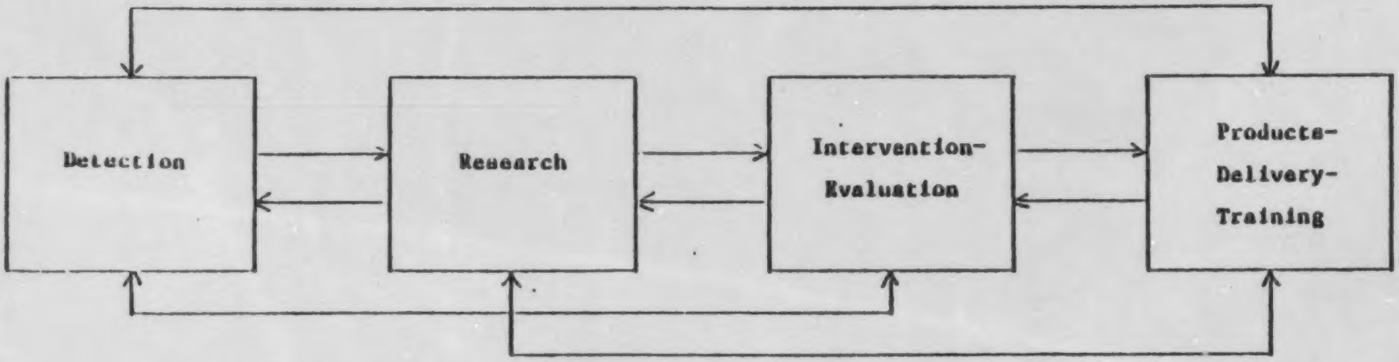

Figure 1. Interrelationship of the Four Basic Units of the Institute.

Training-Products-Dissemination Unit

The main functions of this Unit are to provide the information gained from the other Units to a large number of our colleagues, by the development of specific products, the delivery of these products and, most importantly, the training of professionals to work with at risk and handicapped children. In the Predoctoral Training Program, doctoral candidates will be given research, assessment, and intervention skills to further their careers in working with young handicapped children. A similar Postdoctoral Training Program has also been initiated.

B. INTERRELATIONSHIPS AMONG THE UNITS

The feedback loops of these interrelated units illustrated in Figure 1 will be described below.

Relationship of Detection and Research

Two of the major goals of the Institute include identifying children at risk and assessing the strengths and weaknesses of children with known handicaps. In order to accomplish these goals, there must be continuous basic research to learn more about handicapped and at risk children across the communicative, perceptual-cognitive, and social-emotional domains. Thus, applied research on early identification of children at risk and on comprehensive assessment of the skills of handicapped children is directly related to basic knowledge about normal, at risk, and known handicapped children.

Relationship of Detection and Intervention

To reduce the lag between early identification of children at risk and intervention strategies to remediate detected developmental delays and enhance the skills of handicapped children, communication between the Detection and the Intervention-Evaluation Units of the Institute is necessary. In addition, intervention strategies are somewhat dependent on identification and assessment techniques since these suggest what skills should be emphasized in intervention.

Relationship Between Intervention and Research

The need for identifying salient environmental and constitutional factors which contribute to the normal course of development in the early years of life has been receiving increasing attention in the psychoeducational literature of the past decade. The growth of basic research on normal infant development has increased exponentially in the last decade with no comparable growth of research on infants and young children at risk or with known handicaps. Recent trends reflected in both federal and state policies, and the psychoeducational and medical communities, are redirecting the focus of research to at risk populations (Tjossem, 1976). In order to develop successful intervention strategies for infants across a wide range of settings (e.g., home-based, center-based, hospital-based programs) and involving a variety of practitioners (e.g., parents, teachers, physicians, psychologists, paraprofessionals), the practitioners involved in intervention must be aware of and use basic knowledge of the growth and development of normal and at risk/handicapped children gained from research. Not only will information generated from basic research guide intervention practices, but the results of intervention practices for children at risk will yield valuable information to add to the general body of knowledge on the growth and development of various subpopulations of children at risk and with known handicaps.

The Interaction of Research, Detection and Intervention

The cyclic relationship of research, detection, and intervention is best illustrated by an example. Let us take the attention task developed by Lewis. A number of research studies on the attention paradigm have shown that performance on this task at an early point in the infant's life is a useful predictor of later intellectual development, whether adaptive or dysfunctional (Lewis, 1969, 1971, 1975). For this reason, the attention task is considered an effective identification/assessment instrument and is included in a battery of detection measures. Thus, basic research leads to detection measures. After the attention task has been used as an identification/assessment measure with a handicapped or at risk infant, intervention strategies which specifically address the dysfunctions indicated by performance on this task are implemented. Such intervention involves contingency experiences which make the child more sensitive to his environment and increase his competence motivation and feelings of efficacy in dealing with his environment--in other words, a learning to learn intervention. Thus, specific information from a detection measure is used as the basis for specific intervention techniques. During the course of intervention, the attention instrument is used again, for two purposes: detection or assessment and evaluation. A change in the at risk /handicapped child's performance on the attention task is a measure of his progress during intervention--thus the assessment function. This apparent progress is also an evaluation of the intervention strategy and leads to specific modifications of that strategy. Thus detection and evaluation form the basis for further intervention. The cycle continues in this way (using other detection measures in addition to the attention task) until the "at risk"/handicapped child's dysfunction has been eliminated or remediated to the fullest extent possible.

Meanwhile, research on the group data from a large number of these detection-intervention sequences adds to our knowledge about the predictive power of the attention task as an identification/assessment measure and about the effectiveness of certain intervention techniques. This type of knowledge is used for future detection-intervention-assessment/evaluation-research cycles. This is illustrated in Figure 2.

The Relationship Between Training and the Other Institute Units

The fourth unit in the Institute--Product, Dissemination, and Training--functions as the clearinghouse which insures communication between the various units of the Institute internally, and dissemination of information externally. This unit is also integrally tied to another goal of the Institute, which is a commitment to involve and train educators, psychologists, physicians, and parents in methods of early identification of and intervention with children at risk.

The products of the Institute are disseminated by this Unit. In addition, this Unit trains personnel, delivers curriculum products developed in the Intervention-Evaluation Unit, and is responsible for the dissemination of the

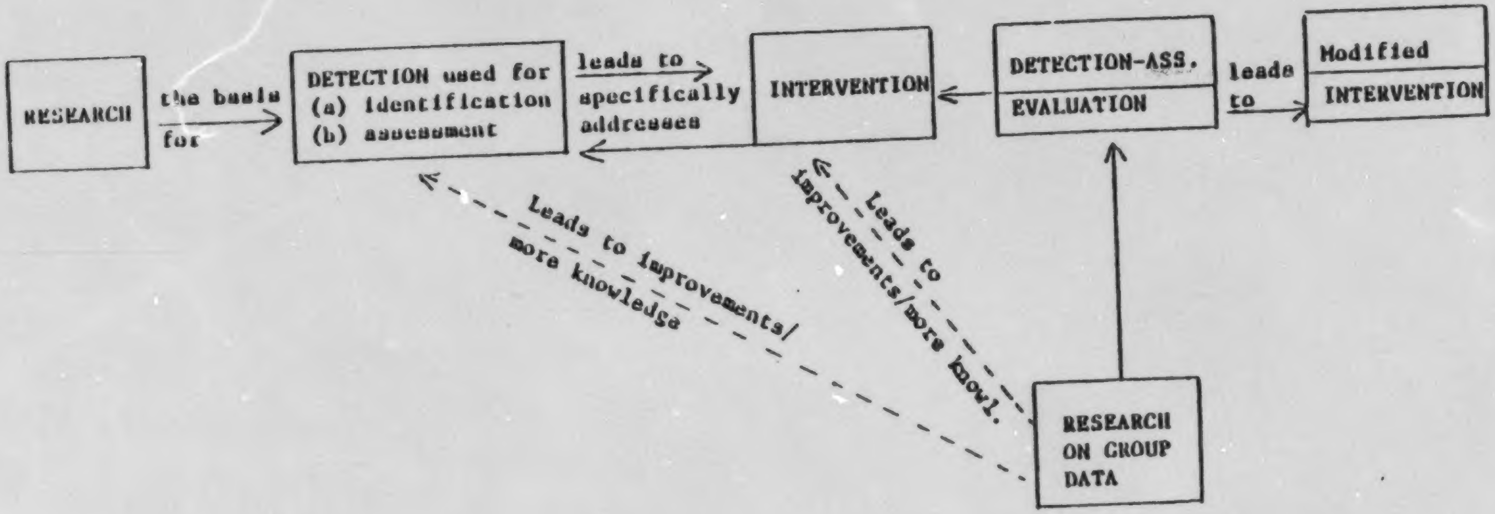

Figure 2: A Schematic Representation of the Interface between Research, Detection, Intervention and Evaluation.

dissemination of the results of the Institute's basic and applied research on detection and intervention to the psychoeducational and medical research communities through the media of professional journals, conferences, and workshops.

C. THE INTERDISCIPLINARY STRUCTURE OF THE INSTITUTE

Another important goal of the Institute is to establish an interdisciplinary approach to the study of exceptional children. To meet this goal, educational, medical, and psychological researchers and practitioners, and parents are serving as members of the Institute's Advisory Board. Further, through the cooperation of medical staff in the Pediatric Service of The Roosevelt Hospital, New York City, the educators and administrators in the Coalition of Administrators of New Jersey Infant Programs, and the research psychologists of the Infant Laboratory, Educational Testing Service, Princeton, New Jersey, the cross-disciplinary approach of the Institute has been established and will be maintained.

The Two Centers

The Institute is comprised of two centers, the Infant Laboratory at Educational Testing Service in Princeton and the Infant Laboratory in the Pediatric Service of Roosevelt Hospital in New York City. Structurally, both are part of the Institute for the Study of Exceptional Children. Administratively, they are also part of the Institute, which is an Institute within the corporate structure of Educational Testing Service. The functions of each Center are discussed, with Table 6 presenting a summary of this discussion.

The ETS Infant Laboratory

The Educational Testing Service Center of the Institute is the home of the administrative staff, the Director, and the Associate Director as well as the Coordinators of the Research, Intervention, and Training Units. The Coordinator of the Detection Unit, who is housed at The Roosevelt Hospital Center, maintains close contact with the ETS staff by traveling to the ETS Center twice a month. In addition, the Associate Director travels to the Roosevelt Hospital Center twice a month to oversee the progress of the Detection Unit and to help with any difficulties that arise.

Besides the administrative and directive functions, the ETS Center is the testing site for all of the Research and Intervention/Evaluation Unit projects and for the Competency Assessment Project of the Detection Unit. Field testing in the Competency Assessment Project is conducted in New Jersey Infant Stimulation Programs under the auspices of the Coalition of New Jersey Infant Program Administrators as well as in New York City Programs. Field testing of the Contingency Intervention Project will take place in both the New Jersey sites as well as the Preschool Program for the Multiply Handicapped at The Roosevelt Hospital.

Rooselvelt Hospital Infant Laboratory

The Roosevelt Center is part of the Pediatric Service of Roosevelt Hospital as well as part of the Institute. Therefore, administrative functions related to the Pediatric Service are handled by the Hospital administrators. Decisions

Table 6

Functions of the Two Centers

Institute for the Study of Exceptional Children

	Roosevelt Center	ETS Center
Dectection Unit	Identification Project Premature Infant Followup Project (Babies Hospital, Columbia University)	Competency Assessment Project
Research Unit	Field Site	Contingency Research Project Pilot Research Project Infant Attention Project
Intervention/ Evaluation Unit	Field Site	Contingency Intervention Project Intervention Products Development Communicative Development in Preschool Handicapped Project Evaluation Project
Training Unit	Predoctoral Training Project	Products and Dissemination Projects Predoctoral Training Project Postdoctoral Training Project

related to Institute functions, however, are made in conjunction with the Director and Associate Director of the Institute. The Roosevelt Center, by being embedded in a large and actively functioning Pediatric Service, has much expertise in the medical field as well as in the specific field of the handicapped.

The Roosevelt Center is the testing site for the Identification Project of the Detection Unit, and the Preschool Program for the Multiply Handicapped is one of the field testing sites for the Contingency Intervention Project in the Intervention Unit. In addition, the Coordinator of the Detection Unit is also the Coordinator for the Roosevelt Center and directs all activities in the Roosevelt Center. Dr. Nathan Fox, who is the Coordinator and Research Scientist in the Pediatric Service of Roosevelt Hospital, is an Advisor to the Institute and meets with the Coordinator of the Roosevelt Center weekly and the Director of the Institute monthly. Ms. Madeline Appell, Chief of the Child Development Section and Director of the Preschool Program, is a member of the Intervention Unit, advising on curricula development and field testing.

D. ADMINISTRATIVE STRUCTURE OF THE INSTITUTE

The Institute consists of a Director, an Associate Director, the Roosevelt and ETS Centers, Institute research staff members, administrative staff members and advisory personnel. The administrative structure is presented in Figure 3. Communication about all Institute functions flows from the Director to the Associate Director, who meet daily, and from these two directly to the Center Coordinators, who meet weekly with the Director and Associate Director. The Administrative Staff for the Institute is part of ETS and communicates with the Director. The Advisory function for the entire Institute is conducted through the Director and involves the Director of Pediatrics, who meets monthly with the Director and Associate Director, and the Advisory Board. The Coordinators of each center are responsible for their respective administrative and research staffs as well as advisory personnel. At the Roosevelt Center, this includes Pediatric Residents; Dr. Neil Lombardi, Pediatric Neurologist, Pediatric Service; Dr. J. Hallahan, Director, Developmental Disabilities Clinic; Dr. Louis Cooper, Director, Pediatric Service and Professor of Pediatrics, College of Physicians and Surgeons; and Ms. Madeline Appell, Chief, Child Development Section. At the ETS Center, advisors include research psychologists in the Center for Assessment and Research in Human Development--Drs. Walter Emmerich; Irving Sigel; Roy Freedle; Samuel Messick; Virginia Shipman; psychometricians--Dr. John Barone and Dr. Donald Rock, and members of the Coalition of New Jersey Infant Program Administrators.

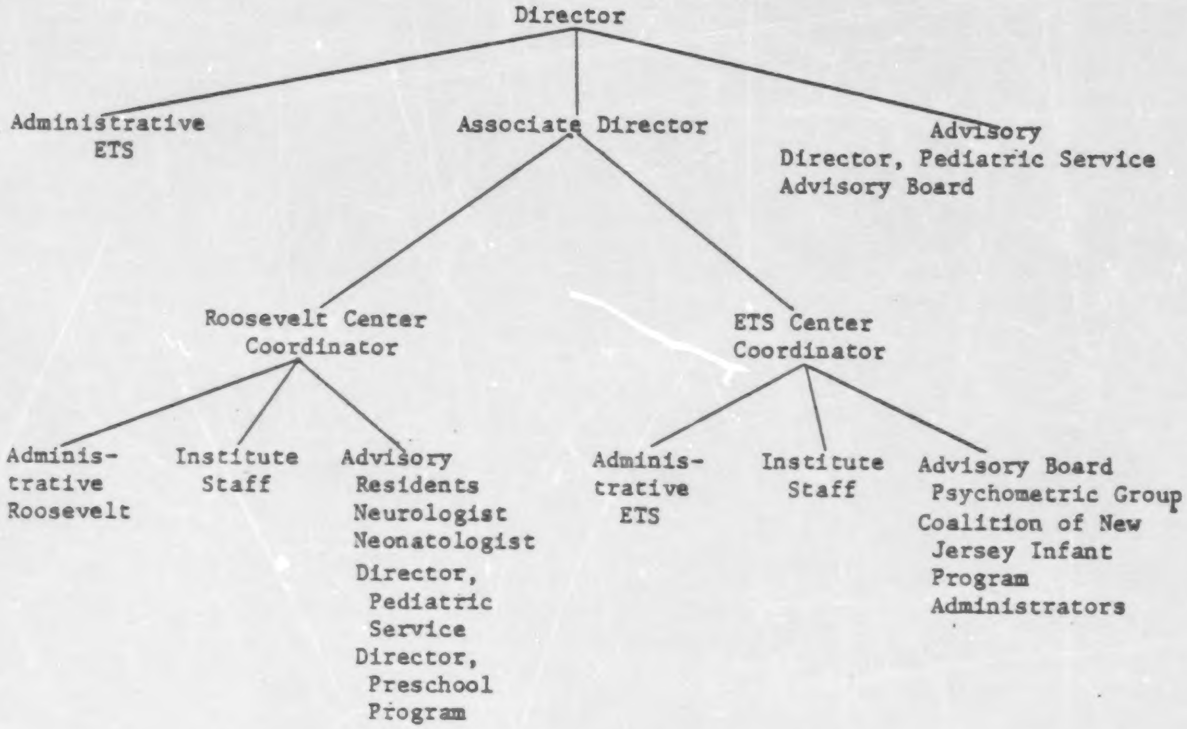

Figure 3. Administrative Structure of the Institute

E. AVAILABLE RESOURCES

Both Educational Testing Service and Roosevelt Hospital have a number of invaluable resources for the Institute. These include ongoing research, intervention, and training programs as well as experts in the fields of medicine, special education, and psychology. In addition, the Coalition of New Jersey Infant Program Administrators and the Advisory Board provide invaluable resource help. These resources are described briefly.

Educational Testing Service

The Infant Laboratory. The Infant Laboratory, which was formed in 1968, is a part of the Institute for the Study of Exceptional Children of Educational Testing Service. At the Infant Laboratory, a staff of about 5 psychologists, special educators and child care specialists annually studies more than 400 babies ranging from one month to three or four years of age. Some infants take part in several studies so we can compare their reactions in different situations and skills; some infants are followed longitudinally over the first three years of life. The Laboratory is concerned with sets of competencies the infant acquires through its interaction with the environment. The research interests of the Laboratory involve the study of a wide variety of competencies, such as socioemotional, cognitive and communicative skills as well as individual differences.

Competency in the social world is primarily concerned with interpersonal relationships while emotional competency deals with the development of specific emotions and the appropriate situational display of these emotions. The following problem areas have been studied within the Laboratory (a complete reference list is presented in Chapter VII):attachment behavior of the 1, 2, and 3 year old infant toward its mother and father; mother-infant interaction, its effect and measurement; studies of emotions, especially fear, its physiological and facial expression as well as the conditions that elicit it; studies of peer relations in the 1 and 2 year old; scales of socioemotional development--an assessment instrument for determining individual differences in socioemotional development in children 0-30 months of age; and self concept, the infant's development of self recognition.

Cognitive competency must include a broad range of abilities including perceptual, intellectual and linguistic functions. Within the Laboratory, we have studied evaluation of infant intelligence tests; psychological measures of attention using the attention paradigm as developed by Lewis and his associates; social cognition or the child's growing awareness of concepts such as age, size, etc.; intersensory integration or the organization of multiple sensory functions; and sensorimotor development and its relationship to attention and intelligence.

Communicative competence involves the study of mother-infant interaction, studying how early communication skills are organized and how they are related to subsequent linguistic capacities; and language development, the relationship of pragmatics to other socialization roles.

Within the study of individual differences, group differences and the function of sex, social class, culture, and birth order have been studied across the domains as outlined. In addition (directly related to the Institute) is our interest in the clinical diagnosis of cognitive competencies including attentional processes and language acquisition in at risk populations.

The St. Luke's-Roosevelt Hospital Center

The Pediatric Service of the St. Luke's-Roosevelt Hospital Center is part of the Pediatric Service of the College of Physicians and Surgeons of Columbia University. Several of its components are being utilized by the Institute.

The Chief of Pediatrics. Dr. Louis Z. Cooper has created a broad range of programs of primary prevention, early detection and comprehensive medical, social service and educational intervention for handicapped children. These programs are unusual in their breadth, interdisciplinary scope and extent of outreach to children previously underserved. Dr. Cooper's enthusiastic commitment to the goals of the Institute provides the priority necessary for program implementation within a medical setting and for subsequent insertion of products of the Institute into curricula for training of health personnel. Dr. Cooper is a member of the Advisory Board and, in addition, provides support and advice to the Institute through monthly meetings with the Director and Associate Director, and weekly meetings with the Coordinator of the Detection Unit.

The Developmental Disabilities Center. The DDC has evolved out of a rubella research program which began at New York University Medical Center in 1962. An interdisciplinary Rubella Project was created in response to the epidemic of rubella in 1964 to facilitate research on rubella vaccines and research and service to the hundreds of victims of congenital rubella referred to the rubella research laboratory. More than 600 children have been evaluated and followed longitudinally since 1965. The Rubella Project continues to function as a center for research on the epidemiology, clinical course, viral immunology and management of congenital rubella and laboratory and community evaluation of rubella vaccines. Women suspected of rubella in pregnancy and infants with possible congenital rubella are referred from throughout metropolitan New York for consultation.

Developmental Disabilities Section. Approximately 2,000 handicapped children in the New York metropolitan area are on the active case load of the medical staff. The unit is supervised by pediatricians with special concern for the provision of continuous, comprehensive care for handicapped children. Their services are provided through public health nurses, social workers, and family health workers at the hospital and through special relationships on site at a number of agencies serving the handicapped in the community. These agencies include the New York Institute for the Education of the Blind, The Lexington School for the Deaf, The New York Association for the Blind (The Lighthouse), the Mid-Atlantic North & Caribbean Center for Services to Deaf-Blind Children and the Manhattan Developmental Center of the New York State Department of Mental Hygiene (Division of Mental Retardation). The Section maintains its own subspecialty clinics for handicapped children in ophthalmology, neurology, orthopedics, cardiology, gynecology, rehabilitation medicine, genetics, dentistry, ENT and hearing and speech.

Interdisciplinary training in mental retardation and other developmental disabilities is a primary function of the program. It is the setting at the present time for many trainees, including two full time Pediatric Fellows in the Care of Handicapped Children, pediatric residents, medical students, undergraduate and graduate students in pedodontics, graduate students in genetic counselling, students of nursing and social work. Training for the Pediatric Fellows is provided by subspecialists in various departments of the medical school, as well as at other institutions in the community including the Rose F. Kennedy Center of the Albert Einstein College of Medicine and the Institute of Rehabilitation Medicine (Children's Division) of the New York University Medical Center.

Fellowship in the Care of Handicapped Children. The Handicapped Children's Section of the Pediatric Service of the Roosevelt Hospital is an interdisciplinary team composed of pediatricians, public health nurses, family health workers, psychologists, genetics counselors and administrative aides serving about 1,800 handicapped children and their families in the New York City Metropolitan area. This section offers a two-year Fellowship in the Care of Handicapped Children to eligible pediatricians. The major goal of the program is to train pediatricians for the comprehensive management of children with single or multiple handicaps. Graduates of this program will be prepared to improve the quality of health services to handicapped children in community clinics and hospitals, schools for the handicapped, governmental agencies, and university facilities. This is a new program, and there is increased interest in developing a truly multidisciplinary activity with the training of residents in child development and the training of child development psychologists in pediatric problems and issues.

Residency Training Programs. The training programs emphasize primary care, defined as "first contact, continuous, and integrationist." In the three year program fulfilling requirements of the American Board of Pediatrics, ambulatory care, behavioral pediatrics and care of chronic illness are receiving substantially more attention than has been provided in traditional pediatric training. A "Mini-Course in Child Development" was produced by Dr. Nicholas Anastasiow for the Roosevelt Pediatric Service during his sabbatical of 1975-76 spent on site at the Roosevelt Hospital. The primary target for this mini-course are the twenty members of the pediatric resident staff. However, it is hoped that after some experience, the course may be used for medical students, nurses, pediatric nurse practitioners and other health workers involved in child and family care.

Pre-School for Multihandicapped Children. The Pre-School for Multihandicapped Children is a component of the Child Development Section. The Pre-School was created in 1967 because of the unmet needs of rubella damaged young children. The Pre-School Program is geared to the child in his environment, is adapted to his specific needs and to his developmental status at the time of intervention. The program recognizes that the diagnosis of the severely handicapped child is an ongoing process that cannot be separated from treatment and that treatment cannot be separated from the home environment if carry-over is to have real impact on the life-style of the multihandicapped child. The educational program is coordinated with medical services and is hospital-based in order to effect the delivery of better and more comprehensive care.

Children to receive service range in age from birth to 6 years; however, older children not yet in a suitable long-range school setting will continue to be eligible for service. Emphasis is placed on the earliest possible intake of the very young child. Eligibility will be based upon suspicion of visual and auditory impairment and the presence of any of the following conditions: cerebral dysfunction, behavioral disturbance, neuromuscular disorders and orthopedic diseases. Initial determination of the clinical status of each child is accomplished by the multidisciplinary Developmental Disability Center staff. A member of the educational team is present during the initial pediatric examination to administer the developmental evaluation. A staff conference is then held in which all disciplines determine jointly what additional evaluation is necessary prior to either immediate referral to a facility within the community or to the Pre-School for Multihandicapped Children.

Some of the major activities of the Pre-School Program are: (1) educational evaluation of children in follow-up; (2) home training (so that activities learned in the hospital-based program can be carried over by the parents into the home environment); (3) audiological evaluation and auditory training; (4) ongoing in-service training for parents and staff; and (5) training students and professionals about to enter or already working in the area of the handicapped.

Regional Perinatal Network. The Perinatology Division at the Roosevelt Hospital is a component of the Regional Perinatal Network created in 1975 with a grant to Columbia University from the Robert Wood Johnson Foundation. Four similar grants were given elsewhere in the United States. The Perinatal Network now is responsible for more than 10,000 deliveries within the four University-affiliated hospitals in upper Manhattan and expects to expand to neighboring institutions with 3,000 to 5,000 additional births annually. The purpose of this regionalization is to decrease maternal and especially infant morbidity and mortality. Evaluation requires a longitudinal follow-up of infants born in network hospitals. Evaluation for all five Johnson Foundation grant recipients has been assigned to a group at Johns Hopkins Medical School. Their activity will provide an unusual comparison with the efforts in this proposal, and in the future may provide a vehicle for dissemination and replication of the products of the Institute's research. If each regional perinatal network is similar in scope to the Columbia project, they will serve collectively 50,000 to 75,000 births annually.

Child Neurology Section. The Child Neurology Section is responsible for inpatient and outpatient neurological services in the Pediatric Service of Roosevelt Hospital, provides clinical training in child neurology to trainees in various disciplines at all levels, and carries out research activities in the field of child neurology, with special emphasis on early identification of developmental disorders.

The Neonatology Section. The Neonatology Section in collaboration with the Obstetrics and Anesthesiology Services comprises a Division of Perinatology for the Roosevelt Hospital. More than 2,500 births are projected for 1977. Because approximately 75% of deliveries are not private patients, but involve drug addicted, methadone maintenanced, and inner city residents, an unusually high proportion of the pregnancies are considered to be at risk. In fact, approximately 15% of newborn infants at the Roosevelt Hospital require admission to the Intensive Care Nursery. Study populations of adequate size will be obtained in the Nurseries, including cohorts of normal and "at risk" newborn infants.

Coalition of New Jersey Infant Program Administrators

The Coalition of New Jersey Infant Program Administrators is an umbrella organization for the primary care programs in New Jersey serving handicapped and at risk children, ages 0-3. The Coalition includes home-based and center-based programs serving both rural and urban areas. While the approach of each program is slightly different, they all address certain problem areas: the adaptive and cognitive development of the handicapped infants, their motor and physical growth, and the psychological adjustment and coping of the infants' parents. Full-time staff and consulting staff for the programs include some or all of the following:

administrators, teachers, physical and occupational therapists, nurses and social workers. The Coalition serves three major functions. First and foremost it functions as a support system through which program administrators can share their financial and administrative concerns as well as their problems and questions about the actual services they provide. The Coalition also disseminates and coordinates information on what is going on in the field of infant stimulation. It sponsors workshops on therapy and curriculum and alerts its members to important events of interest to educators and therapists of handicapped infants—e.g., relevant legislative action, new government grants for infant programs, etc. Finally, the Coalition functions to integrate the services of its members. By fostering communication among the programs, duplication of services is avoided and each program offers its own knowledge and expertise to the others.

The Institute has actively worked with the Coalition, attending its meetings, joining the Coalition, making several presentations to the Coalition, advising members about psychological issues, and so on. This relationship will continue and perhaps, if the Coalition becomes more than a loose federation, become more formalized.

Advisory Board

The Advisory Board has been established as an independent group consisting of persons known in the fields of special education, developmental psychology and intervention with handicapped populations. The Advisory Board is in a special position in advise the Director and staff of the Institute of the feasibility of the various programs.

Advisory Board members include:

Nicholas J. Anastasiow, Ph.D.
Professor and Director
Institute for Child Study
Indiana University

Peter Bierman, M.A.
Educational Psychologist
Executive Director of Project Child
Mercer Infant and Preschool Programs

Jane Chazkel, M.A.
Educational Psychologist
Program Director, Early Intervention Program, Inc.

Shirley Cohen, Ph.D.
Special Education
Director, The Special Educational Development Center
Hunter College

Sara Carlton, M.A.
Education
Director, Child Development Program
Hunterdon Medical Center

Solon Chau, M.D.
Pediatrician
Medical Director, Perinatal Network
Physicians and Surgeons Hospital
Columbia University Medical Center

Frances Connor, Ed.D.
Special Education
Director, Special Education
Teachers College
Columbia University

Walter Emmerich, Ph.D.
Senior Developmental Psychologist
Educational Testing Service

Louis Z. Cooper, M.D.
Pediatrician
Chief and Professor
Department of Pediatrics
Roosevelt Hospital

Helen Fulmer, Ph.D.
Executive Director
Special Education Pupil Personnel

Michael Lewis, Ph.D.
Development Psychologist
Director, Infant Laboratory
Educational Testing Service and
Professor of Clinical Pediatrics
Columbia University Medical Center

Donna O'Hare, M.D.
Pediatrician
Director, Maternal-Infant Care Program

John Siepp, Ph.D.
Education Consultant
Professional Services Program Department
United Cerebral Palsy

Herbert Zimiles, Ph.D.
Developmental Psychologist
Chairman, Research Division
Bank Street College

Stanley James, M.D.
Neonatologist
Professor of Pediatrics
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William J. Meyer, Ph.D.
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Training Program
Syracuse University

Virginia Shipman, Ph.D.
Senior Developmental Psychologist
Educational Testing Service
Senior Research Assistant
Institute for Urban and Minority Education
Teachers College

Irving Sigel, Ph.D.
Developmental Psychologist.
Director, Child Care Research Center
Educational Testing Service

Vera Zorn, Ph.D.
Associate Professor of Education
Director, Infant and Toddler Leadership Program
New York University School of Education
Health, Nursing and Arts Professions

Years 1 and 2

During the planning year, an initial meeting was held at the Roosevelt Hospital and was attended by most of the Advisory Board members. The Institute staff was introduced and an outline of the various components of the Institute was presented. In addition, Dr. M. Lewis, Director of the Institute, presented the theoretical foundations on which the proposed detection, research and intervention programs would be based. A number of important issues were raised by Advisory Board members in relation to Institute research strategy.

In response to those questions, letters contacting all Advisory Board members, soliciting their opinions on a wide range of subjects, were sent out. Institute planning has taken into account the feedback from Advisory Board members.

Year 3

Two Advisory Board meetings have been scheduled, the first having to do with the activities conducted in the Educational Testing Service Infant Laboratory (Research, and Intervention Units) and the second having to do with the activities conducted in the Roosevelt Hospital (Detection Unit). At Educational Testing Service, Advisory Board members and other developmental psychologists met with Drs. Lewis, Brooks-Gunn, and Brinker for two mornings to discuss the research and curriculum development currently underway. Among those present were Dr. Samuel Messick, Vice-President of Research; Dr. Irving Sigel, Distinguished Research Scientist; Drs. Walter Emmerich, Virginia Shipman, Curtis Banks, and Donald Goodenough, Senior Research Scientists. Issues discussed included the application of research to intervention problems, the comparability of normal and handicapped populations, the problem of variability within handicapped samples, and the importance of early contingency training.

Year 4

In May of 1980 the Advisory Board met with Drs. Lewis, Brooks-Gunn, Fox, Brinker and Feiring to review the ongoing activities of the Institute and to plan the future activities and priorities of the Institute. This meeting was especially important in our continuing evaluation of our activities. Issues discussed included the applicability of our basic and intervention research to the multiply impaired, the public policy implications of the research and the problems involved in assessing the handicapped. The meeting was highly successful, with a great deal of discussion generated about the applicability and uses of the research done in the Institute.

Year 5

The Institute staff continued to view the Advisory Board's function as active participation in the formation of research and intervention strategy. The staff met with individual members of the Board to discuss theoretical and methodological issues related to research and intervention. Specifically, Drs. Emmerich, Siegal, Shipman, Anastasiow, Bierman, Chazkel, Carlton, Chau, Siepp, Connor, and Cooper were consulted as members of the Advisory Board.

Definition of Subject Population Groups

Two groups of children are the focus of our Detection, Research, Intervention, and Training efforts: children with a known handicap and children at risk for developmental dysfunction.

The known handicap category includes conditions that are more or less easily identifiable, have a known etiology, and usually are diagnosed medically. In 1975, handicapped children included "mentally retarded, hard of hearing, deaf, impaired, visually handicapped, seriously emotionally disturbed, crippled, or other health impaired children who by reason thereof require special education or related services" (Federal Register, 1975).

There are two subcategories of at risk children: biological risk and environmental risk. The biological risk category includes children who, because of a biological insult in the prenatal and neonatal stages of development, have a higher probability of exhibiting developmental delays or deficits than children not having such biological insults. Both maternal and child variables may result in this classification. Women who are addicted to heroin, who are maintained on methadone, who have diabetes, and who have had grossly inadequate nutrition during pregnancy have children who would be classified at risk. Interestingly, other maternal actions may adversely affect a child's later development, such as cigarette smoking or drug ingestion (e.g., tranquilizers, sedatives, aspirin). However, at the present time, little is known about long-range effects of these agents on later development. Labor and delivery variables such as toxemia and drug use, and neonatal characteristics such as low birth weight, anoxia, RDS, small for gestational age, and disease states also increase the probability of developmental delays; hence children with these characteristics would also be classified as at risk.

The environmental risk category includes children who, although biologically intact, have had early experiences which increase the probability of later delays and deficits. Because most of these early experiences involve the family, environmental risk conditions are usually defined vis-a-vis the family. Disrupted, disorganized households, parental neglect and parental abuse, and parental ignorance may all result in impaired health care, relationships, social stimulation, and opportunities for exploration of the environment. These children are not the direct concern of our Institute at this time. However, some children identified as environmentally at risk will be seen as a control group for the biologically at risk group. These children will be from poverty and minority backgrounds.

We recognize that these classifications are not as clearly delineated as they seem at first glance. Children may move from one category to another. Indeed, by definition, many of the children considered to be in the at risk category at birth are later diagnosed as having a known handicap--e.g., mental retardation.

Description of Subject Population

Following is a brief description of the subcategories of children which will comprise our subject groups, including Down's Syndrome, primary auditory impairment, primary physical impairment, multiply handicapped, and low birth weight infants.

Down's Syndrome

Down's Syndrome (mongolism) is the most common cause of congenital retardation. From 10 to 20% of severely retarded children are of this type. Infants with Down's Syndrome have physical as well as mental handicaps. Many have congenital heart disease and upper respiratory problems. Most infants with Down's Syndrome have muscular hypotonia (felt to be a symptom of their CNS disease). This hypotonia may cause a delay (out of proportion to mental delay) in motor development, specifically major motor development (sitting, standing, walking, etc.). Though children with Down's Syndrome are usually identified in early infancy, we have surprisingly little scientific data concerning their functioning at that point. Since 1959 when the chromosomal abnormalities at the base of this syndrome were first identified, thousands of individuals with this disorder have been studied in terms of chromosomal makeup, physical characteristics, family history, etc. (Koch & de la Cruz, 1975). But large scale or comprehensive studies of the developmental functioning of this population are rare (an exception being the recent work of Cicchetti & Sroufe, 1977).

Primary Physical Impairment

Most of the children involved in the Institute who fall into the primary physical/motor impairment group have cerebral palsy. There are estimated to be seven cerebral palsied children born per 100,000 live births (Diller, 1972). Cerebral palsy is a non-progressive condition which has been described as "a condition characterized by paralysis, weakness, incoordination or any other aberration of motor function due to the pathology of the motor control system of the brain" (Perlstein, 1952). Although motor dysfunction (paralysis, spasticity, clumsiness, ataxia) or involuntary movements (chorea and athetosis) are the most striking symptons of cerebral palsy, associated involvement of other cerebral systems frequently accompanies these symptoms. The various causes of this nervous system pathology include perinatal asphyxia, birth trauma, in utero infections (e.g., rubella) and postnatal insults such as neonatal meningitis, excessive jaundice (leading to deposition of bilirubin pigment in certain motor control areas of the brain) and vascular disorders (stroke), etc.

Intelligence among the cerebral palsied varies greatly. It is estimated that at least 40-50% of children with cerebral palsy are mentally deficient (Crothers & Paine, 1959; Cruickshank & Rans, 1955; Stephen & Hawks, 1975).

Primary Auditory Impairment

The Annual Survey of Hearing Impaired Children and Youth (Office of Demographic Studies, 1973) indicates that 3 in every 4,000 children aged 5-19 years in the United States are deaf. This is defined as a 91 db. (ISO) hearing loss or greater in the better ear. In addition, 1 in every 200 children is hard of hearing. A survey of 34,000 deaf students in 1971 indicated that 79% were reported to have been deaf from birth, while 11% were deaf by one year of age. Only 7% were reported as becoming deaf after the age of two.

The etiology of the hearing loss is particularly important in indicating whether an infant is at risk for additional physical and mental handicaps (Meadows, 1975). The 8-10% of all deaf children who have presumptive evidence of hereditary deafness are generally less vulnerable for additional damage to the central nervous system (Meadows, 1975). However, four of the five known leading causes of deafness: anoxia, meningitis, congential rubella and Rh incompatibility are also known to cause cerebral dysfunction. In Vernon's survey of RH deaf children (1969), about 70% were multihandicapped, half with cerebral palsy. Schlesinger (1971) found that perinatal anoxia and traumatic instrumentation are also associated with multiple handicaps (Meadows, 1975). In a study of 120 children, deaf as a result of congenital rubella, Appell (1976) found that 68% of the children had central language impairment in addition to severe-profound sensorineural hearing loss.

Deaf children usually score within the normal range on intelligence tests, but only when tested nonverbally. Little is known about the deaf child's ability to attend to different presentation modes; auditory, visual, bimodal cues, and whether this is inherent, or idiosyncratic learned sets (Meadows, 1975).

The Multiply Handicapped Infant.

Until recently, no acceptable or precise definition of multihandicapped existed. Given the definitional problem, it is difficult, if not impossible, to either identify the population nor describe incidence rates (Newkirk, Bloch, Shrybmon, 1978). The Federal definitions distinquish between the fairly discrete category of deaf-blind, and the more general category of multi-handicapped. Deaf-blind is defined as:

> concomitant hearing and visual impairments, the combination of which causes such severe communication and other developmental and educational problems that they cannot be accommodated in special education programs solely for deaf or blind children.
>
> Multihandicapped means concomitant impairments (such as mentally retarded-blind, mentally retarded - orthopedically impaired, etc.), the combination of which causes such severe educational problems that they cannot be accommodated in special education programs solely for one of the impairments (Federal Register, 1975).

To further delineate the definition of multi-handicapped, Walker (1975) queried 96 programs for deaf-blind and multi-handicapped, an endeavor that yielded a definition including two handicaps, handicaps requiring a combination of technologies, and handicaps requiring extraordinary modifications of methods. Furthermore, it has been noted that several simultaneous handicaps affect the child's development multiplicatively rather than additively (Hart, 1969).

The incidence of deaf blind has been estimated at between 4,000 and 5,000 children between 3 and 18 and births of deaf-blind children (in non-rubella epidemic years) at 140 per year (Brewer & Kokalik, 1974). Estimates of multi-handicapped children are difficult to make, given the definitional problems. Kishi (1974) has placed the number between 15,000 and 36,000 children, depending on the definition used. In addition, many children classified under other categories are probably multi-handicapped: for example, over one-half of cerebral palsied children are mentally retarded (Kirk & Elkins, 1975). In a Georgia study of handicapped children, Wishik (1964) found that 71% of the children had more than one handicap, and the average per child was 2.2 disabilities. Furthermore, the incidence of multihandicapped children may be increasing (Hewitt & Forness, 1977; Newkirk et al., 1978), due to our medical success with at risk neonates.

One of the large groups of multiply handicapped infants are those whose mothers contracted rubella prior to the birth of their child (Cooper, 1968; Desmond et al., 1967), an occurrence which often leads to the birth of an infant who is both deaf and blind. Often, physical and cognitive impairment is an additional difficulty. Given the degree of handicap and difficulty of assessing the development of these infants, relatively little research concerning their development exists except in purely medical terms although each handicap in isolation has been studied. Other multihandicapped young children are currently being studied by the principal investigators in the Institute for the Study of Exceptional Children.

Low Birth Weight

There are two subcategories of low birth weight infants who may be distinguished from each other by etiology and prognosis of later at risk conditions. The two groups are infants small for dates (SFD) and infants appropriate for dates (AFD) but premature.

The AFD baby may be the result of a complication in pregnancy. These infants, while small in weight, may have a fairly positive medical and psychological prognosis. Because their immunologic and other organ systems are undeveloped, they are susceptible to infectious illness postpartum. On the other hand, if adequate medical care is administered and they are allowed to mature and gain weight with no other complications, they may be free of gross CNS damage. However, little work has been done examining the psychological effects on the infant due to his lengthy medical treatment and stay in the intensive care ward--nor has much research been done on the effect the birth of such an infant has on parents.

The SFD baby is usually the result of retarded fetal growth. These infants are associated with greater frequency of toxemia in the mother, higher rates of seizures and mental retardation. Infants subject to intrauterine growth retardation have been shown to have reduction of both weight and cellular composition by 1/3 for the cerebellum and by 1/5 for the rest of the brain (Chase et al., 1972). And, a number of studies have found that children who were SFD have poorer scores of intellectual functioning than AFD babies. The possibility exists that insult to the brain occurring as a result of growth retardation may contribute to later functioning.

The two groups of low birth weight infants, SFD and AFD, offer us an opportunity for studying the relation of biological insult to environment when insult occurs at different times in the infant's development. The problems of an AFD infant begin after birth with the many complications due to immaturity. The problems of the SFD baby may begin earlier and take a very different course. Within both populations, incidence of handicap has been reported--cerebral palsy and auditory impairment in AFD samples; mental retardation and seizure disorders in SFD infants. And, while the incidence of major CNS insult has decreased in both populations, the rate of severe behavioral and learning disorders in young children who were either AFD or SFD continues to rise. Thus, both groups should be considered at risk for later handicapping conditions. Both groups are being tested in two Institute Projects -- the Identification Project and the Premature Infant Followup Project.

G. THE INSTITUTE AND ITS RELATIONSHIP TO THE RFP

Uniqueness of the Institute

The most unique aspect of our Institute is the "marriage" of a research and a primary health care institution. The relationship is crucial to 1) facilitate communication between research and medical institutions and insure more rapid application of research information for detection and intervention purposes, 2) insure more complete dissemination of research information, and 3) develop comprehensive training of persons who will work with handicapped and at risk populations.

The Institute and the Four General Priorities

The Institute speaks to the importance of the four areas of concern outlined in the RFP, i.e., 1) the documentation of educational interventions, 2) the description of the handicapped child's larger environment, 3) the description of the child's characteristics, and 4) the documentation of the child's progress. Each of these concerns has been addressed by the Institute. A discussion of their relationships to the Institute follows.

Documentation of Educational Intervention

The Institute addresses the need for a more effective means of documenting educational interventions in several ways. The underlying premise of the Intervention-Evaluation Unit--the importance of the experience of action-outcome contingencies in a child's early interaction with the world--provides a valuable basis for the characterization of intervention methods. Characterization of the learning to learn intervention program will include discussion of the areas of the child's functioning in which contingent experiences are facilitated, description of the materials and methods used to make the child's physical and social environment more responsive, analysis of important sequences of contingency experience and examination of factors which impinge on our contingency-intervention methods, either impeding or facilitating them.

Documentation of the results of the Intervention Program will also be carried out by using the Competency Assessment Profile. The CAP provides a means of monitoring a child's progress over time, determining what types of intervention are needed, and also serves as a check on the effectiveness of the intervention program, including the success or failure of small sub-components of the Intervention Program. Analysis of the effectiveness of our Intervention Program by means of the CAP will be done on an individual basis to address how the contingency-experience interventions are working for each child, and also on the basis of group data to address the effectiveness of the program and its sub-components for infants with specific handicapping or risk conditions, for different age and SES groups, etc. Finally, the CAP will be used for documentation of the effectiveness of the intervention methods for a number of different early intervention environments—hospital-based programs, center- and home-based programs, programs which stress parent involvement, programs with many professional staff members, those with mostly para-professional or lay staff, etc. The CAP is a more useful instrument for monitoring the success of our intervention program on an individual and group basis than those more commonly used which simply give a score—e.g., the Bayley. As with our intervention program, the CAP is valuable in pinpointing strong and weak sub-components of an intervention program.

Finally, the different measures included in the CAP battery provide a guideline for describing and evaluating educational interventions. Our program can be characterized, not only in terms of the contingency experiences it provides, but also in terms of the way it approaches the skill areas delineated by the CAP—information processing skills, self recognition and self concept, understanding of the object world and of causality, skills in interacting and communicating with the social world, etc.

Description of the Handicapped Child's Larger Environment

It is evident that we view the larger environment of a child -- both physical and social -- as a crucial factor in development. The need for improved methods of describing the child's environment and for identification of those aspects of the environment which have impact on the child's adjustment and progress will be addressed by the Detection, Research and Intervention-Evaluation Units of our Institute.

Because we view the infant as a social organism, we have included in the Identification and the Competency Assessment Projects multiple measures of the child's social environment. For example, the Mother-Infant Interaction Scale facilitates critical analysis of the infant's interaction with the most important member of his early social environment. Closely associated with the ways a parent interacts with its handicapped/at risk infant are his/her attitudes toward the child's impairment. For this reason, we have included a Parental Attitude Questionnaire. Another measure of the child's interaction with the social world is derived from our Social-Emotional Scales of Development. Using these scales we can assess the child's behavioral and emotional response in specific situations with specific people.

Information on each child's social environment is useful background information for an intervention program. It is important to know what types of interactions the mother engages in with her infant and the attitudes of the parents toward the infant's impairment before planning a program for the child. If, for example, the infant's father is very upset by his child's handicap and avoids the child, it would probably be unwise to use an intervention program which initially requires a great deal of involvement on the father's part. In addition, this information may be used to pinpoint aspects of the environment which can and must be changed through intervention. In the above-mentioned example of the distraught father, methods would need to be devised which would alter the father's negative attitude toward his infant.

The work of the Intervention Unit will address the need for description and analysis of the handicapped/at risk child's larger environment in two ways. First, we will be implementing the intervention strategies in several different types of environments. We will keep track of the important characteristics of different environments which appear to affect an infant's behavior and skill development, as well as execution of our own intervention program. The second way in which the intervention plans address the environment issue is that our strategies will result in changes in the infant's social and physical environment.

In sum then, in the course of the detection, intervention and research efforts we expect to arrive at more precise descriptions of the handicapped/at risk infant's larger environment and more conclusive statements about the impact of certain environmental factors on the early development of these children.

Description of Child Characteristics

Each unit of our Institute addresses the importance of producing a description of child characteristics. First, the purpose of the Detection and Research Units is to improve the description of atypical children's development across a range of skills. It is logical that a battery of assessment tools will tell more than one infant intelligence test yielding a single score. Our multifaceted approach will focus on an analytic rather than global understanding of the child's abilities. We will examine the major areas of development—cognitive, socio-emotional, communicative, motor—and will generate profiles that describe functioning in each of these domains. It is also possible to combine data from any number of different areas and discover clusters of skills that characterize a child. In the case of the handicapped or at risk child this profile implies a greater understanding of the child's functioning than a diagnostic classification which merely suggests group generalizations that apply to the category. This battery of assessment techniques and the profiles that result fit with the view of an interaction of skills in the infant which is one of the developmental principles guiding the efforts of our proposed Institute. Evaluating a skill domain at one point in time does not directly predict functioning in that domain at a later time. Any predictive effort must consider other skill domains that will interact either functionally or dysfunctionally to produce the later measure. The various components of our assessment procedures facilitate consideration of the interaction of skills. In addition, the procedures used in the Detection and Research Units will increase our understanding of different handicapping conditions. Our research will give a more detailed picture of the patterns of strengths and weaknesses of each category than has been available in the past, while repeated assessment over time will demonstrate how the handicap manifests itself in the different domains of functioning at different ages.

Second, the complete descriptions of child characteristics are important for intervention so that we are able to characterize a handicapped child in terms of his strengths as well as his weaknesses and design curricula capitalizing on his strengths and attacking his weaknesses. Finally, the description of child characteristics is vital for training the variety of professionals who will work with young handicapped children. It will guide these practitioners to be more sensitive to looking at the various domains of functioning and to rely less on standard classifications.

Documentation of Child Progress

The goal of improving methods of documenting child characteristics is closely related to the task of improving methods of describing child progress. The assessment and identification projects give measures on a full range of skills within the major domains of development. Thus, it is possible to make an initial evaluation of a child which is both thorough and highly descriptive. The profile of the child's skills can then be used as a basis to plot the child's progress. By repeated assessments, updated profiles are obtained, giving equally extensive information on the child at later points in time. A multitude of comparisons can be made from these profiles and the child's progress can be appraised with great specificity.

Our identification and assessment techniques permit us to measure the progress of children who, because of the nature or severity of their handicapping conditions, have been difficult to assess using existing techniques. For example, our attention task is an alternative and superior means of looking at the child's cognitive functioning than psychometric tests. No objects need to be manipulated and the child does not have to be mobile. The only requirement is that he be awake and alert. Visual and/or auditory stimuli can be used in the attention task so it is still an appropriate measure for infants with an impairment in either one of these modalities.

Part of the task of improving methods for evaluating the progress of the handicapped child is improving the referents, e.g., normal child progress, against which the at risk or handicapped infant's progress can be compared. We have already collected voluminous data on normal infants and will be collecting information across the various at risk and handicapped populations. Therefore, the pace of progress of handicapped and at risk infants can be compared to that of normal infants. Examining the change in many skills over time will also allow comparison of the sequence of progress for handicapped, at risk and normal infants. Skipping steps in that sequence could be a signal of future dysfunction in a particular skill domain.

Thus, in working to improve methods of describing child characteristics, our proposed Institute is also serving to improve methods of documenting child progress. The two go hand-in-hand because when we are better able to characterize the child we are better able to specify how that characterization changes over time and thus document the child's progress.

Priorities 1 and 2 and the Institute

The Institute speaks to the first two priorities directly. These priorities are (1) detection and identification of infants who will be mildly to moderately delayed and (2) curriculum development for severely impaired, handicapped infants. Both target populations—at risk ("mild to moderately delayed") and handicapped ("severely impaired")—will be studied in our Institute. However, in contrast to the RFP, both populations will be studied in both priorities.

Detection in Target Populations

The proposed research in the Detection Unit will include development and refinement of a comprehensive skills assessment tool, the Competency Assessment Profile. Across the four general domains of functioning, i.e., cognitive, socio-affective, communications and motor development, specific skill development will be assessed for at risk infants and handicapped infants. Neonates will be identified in the first month of life and studied longitudinally in the Identification Projects for at risk infants. The functions of the Identification Projects of children at risk include (1) developing an assessment tool which is sensitive to the earliest indications of developmental dysfunction in infants identified as at risk, and which facilitates design of effective early intervention programs, (2) using this assessment tool to determine when the earliest signs of developmental delay do appear and to behaviorally specify these signs, and (3) determining the relationship between early signs of dysfunction and the type of impairment evidenced in later development. The functions of the Assessment Projects of handicapped infants include, (1) early and specific identification of strong and weak skills of children with known handicaps, (2) facilitating the designing of effective early intervention, and (3) continually monitoring the progress of skill development in the course of intervention using the assessment tool.

In the course of our work in the Detection and Intervention Units, we will continue to collect data, using the CAP on the development of groups of normal, at risk, and handicapped infants. This data will provide us with norm-referenced information for comparisons with the risk and handicapped groups. Further, new referencing information will become available using the at risk and handicapped groups as referents for individual children within the appropriate sub-population.

Curriculum Development in Target Populations

The results of basic research on the growth and development of the normal, at risk, and handicapped infants will provide one source of continuous knowledge to be translated in the applied area of curriculum development. This will be an ongoing function within the Institute. In addition, the program of intervention insures that applied research on the learning to learn curriculum will be continually evaluated along a variety of dimensions. We will be evaluating the comparative effects of the learning to learn curriculum across the various target populations, across various environmental settings (e.g., home vs. center-based vs. hospital-based programs), across a variety of personnel. These are just a few of the many research proposals listed in various places in the proposal. What we would like to stress here is that the applied research on the learning to learn curriculum will be under constant evaluation, as we have defined this as one of the functions of the Intervention-Evaluation Unit.

The unique cooperation between the Infant Laboratory at Educational Testing Service, the Pediatrics Division of Roosevelt Hospital, and the Coalition of Administrators of New Jersey Infant Programs provides a broad based network of information exchange across three important areas of knowledge for designing curriculum, i.e., current knowledge on the normal development of infants and basic research on at risk and handicapped infants (Educational Testing Service), current medical knowledge on at risk and handicapped infants (Roosevelt Hospital), and current educational knowledge on the education of at risk or handicapped children (New Jersey Coalition). Thus, the continuous and cooperative endeavor of these three groups gives us confidence that all recent and relevant research information will flow through the Institute and be used to modify an intervention program. The current "state of the art" that our curriculum will reflect will traverse the fields of medicine, education and developmental research.

The process of defining objectives for intervention will be based directly on the results of the assessment of at risk and handicapped children on the CAP. The timing and duration of specific interventions will be determined by reassessment on the CAP to determine the child's progress; the sequencing of steps in the learning to learn curriculum will be based on our knowledge of the normal development of the child. The actual instructional methods in the contingency based curriculum have been described through a number of examples in the Intervention-Evaluation Units. Again, decision-rules concerning the application of the curriculum will be based on the strong and weak skills identified in the assessment. Further, the ongoing evaluations using the CAP, parent/teacher questionnaires, and longitudinal research will provide a plethora of information for the Institute to assess the learning to learn curriculum.

We believe the task to establish a valid curriculum for a wide range of infants, in a variety of programs, with a variety of caregivers is a large and difficult task, but not impossible. The joint effort and contribution of perspectives, competencies, and resources of the three cooperative groups we believe to be the primary strength of the Institute in achieving the goal of a valid and comprehensive curriculum. The combined resources, imagination and expertise of these three groups are the foundation blocks for growth and development of the Institute.

Priorities 3 and 4 and the Institute

Throughout the proposal we have referred to types of research which will be done with data from our detection and intervention-evaluation endeavors. Included among these research topics are responses to priorities 3 and 4. The Institute's intervention and detection programs will be carried out in a number of locales, including the home, hospital and educational centers, which place different emphases on parental participation and have different numbers and types of staff members, including physical therapists, teachers, nurses, physicians, psychologists, parents and para-professionals. This variety insures that we will have ample opportunity to study the variables outlined in Priorities 3 and 4. We have called these priorities minor because, unlike Priorities 1 and 2, they are not central to the Institutional structure of detection and intervention. We do, however, view the impact of program variables, including the structure for distributing services and the impact of staffing patterns as critical areas which we will study in the course of our research endeavors.

H. PERSONNEL AND TIME SCHEDULES

Personnel

In order to carry out the multiple tasks of the Institute, a large and diverse set of personnel in necessary. This staff includes special educators, developmental psychologists, pediatricians, neonatologists, and child neurologists. A listing of the major contributors to the Institute follows. The curriculum vitae of these persons are included in the appendix.

Michael Lewis, Ph.D. is the Director of the Institute. A developmental psychologist interested primarily in research in infancy, he holds a Clinical Professorship in Pediatrics at Columbia University, is Senior Research Scientist at Roosevelt Hospital, and is currently Director and Senior Scientist at the Infant Laboratory at Educational Testing Service in Princeton. New Jersey.

Jeanne Brooks-Gunn, Ph.D. is Associate Director of the Institute and Coordinator of the Research Unit. She is a Research Scientist in the Infant Laboratory at Educational Testing Service and at the Pediatric Service of Roosevelt Hospital, and an Assistant Professor of Clinical Pediatric Psychology of the College of Physicians and Surgeons, Columbia University. A developmental psychologist, her interests include the assessment of handicapped infants, social and emotional development in infancy, and sex role development.

Nathan Fox, Ph.D. is the Coordinator of the Infant Laboratory at Roosevelt Hospital Detection Unit and is in charge of the Identification Project of the Detection Unit. He is a Research Scientist in the Pediatric Service at Roosevelt Hospital and in the Infant Laboratory at Educational Testing Service and is an Assistant Professor of Clinical Pediatric Psychology, College of Physicians and Surgeons, Columbia University. A developmental psychologist, his special interests include the study of at risk infants, memory development, and cross-cultural comparisons.

Richard Brinker, Ph.D. is Coordinator of the Intervention-Evaluation Unit. He is a Research Scientist in the Infant Laboratory at Educational Testing Service. Formerly the Director of the Preschool for Multiply Handicapped at the Meyers Rehabilitation Institute at the University of Nebraska Medical School, his interests include early intervention, communicative competence, and mainstreaming.

Madeline W. Appell, M.A. is Director of the Pre-School for the Multiple Handicapped Children at Roosevelt Hospital. She is a member of the Intervention-Evaluation Unit.

Louis Z. Cooper, M.D. is Director, Pediatric Service, the St. Lukes/ Roosevelt Medical Center. Besides serving on the Advisory Board, he is involved in all functions conducted at Roosevelt Hospital. His research interests include the study of sepsis and long-term follow-up of rubella children.

Various research assistants, predoctoral fellows, and postdoctoral fellows, currently of staff both at Educational Testing Service and Roosevelt Hospital are involved in the project. Their backgrounds include child development, special education, and social work.

Following is a list of the current members of the professional staff and doctoral fellows of the Institute for the Study of Exceptional Children:*

Michael Lewis, Ph.D.	Director of the Institute
Louis Z. Cooper, M.D.	Chairman, Department of Pediatric Service of The Roosevelt Hospital; in advisory capacity to the Institute
Jeanne Brooks-Gunn, Ph.D.	Associate Director of the Institute Coordinator, Research Unit
Richard P. Brinker, Ph.D.	Coordinator, Intervention/Evaluation Unit
Candice Feiring, Ph.D.	Coordinator, Infant Laboratory at ETS
Nathan Fox, Ph.D.	Coordinator, Detection Unit Coordinator, Infant Laboratory at The Roosevelt Hospital
Madeline Appell, M.A.	Director, Preschool for Multiple Handicapped at The Roosevelt Hospital
Margaret Thorpe, M.A.	Research Associate, Intervention Unit
Dulce Urena	Community Worker, Detection Unit
Cecelia Rodrequez	Community Worker, Detection Unit
Margaret Sullivan, Ph.D.	Senior Research Assistant, Intervention Unit
Mary Enright, Ph.D.	Senior Research Assistant, Detection Unit
Joyce Gant, A.A.	Research Assistant, Intervention Unit
James Rosso, B.A.	Research Assistant, Research Unit
John Jaskir, M.A.	Research Assistant and Computer Programmer Infant Laboratory
Joe Lao, B.A.	Research Assistant, Detection Unit
Lorraine Lucciano, B.A.	Research Assistant, Detection
Eric Holme	Laboratory Technician
Annie Hernandez, B.A.	Research Assistant, Detection Unit

Louise Tubio-Cid, B.A.	Research Assistant, Detection Unit
Miriam Kotsonis, Ph.D.	Postdoctoral Fellow
Jane Leifer, Ph.D.	Postdoctoral Fellow
Linda Michalson, Ph.D.	Postdoctoral Fellow
Sandy Cortelyou	Predoctoral Fellow
Margaret Bendersky, M.A.	Predoctoral Fellow
Carolyn McGuffog, M.A.	Predoctoral Fellow
Lauren Brandt, M.A.	Predoctoral Fellow
Marion Stoltz-Loike	Predoctoral Fellow
Phyllis Urman-Klein	Predoctoral Fellow
Lucille Weistuch, M.A.	Predoctoral Fellow
Lauren Abbe	Predoctoral Fellow
Richard Cann, Ph.D.	Engineering Consultant
Joanne Branham	Administrative Assistant, Infant Laboratory
Rosemary Deibler, A.S.	Administrative Secretary, Infant Laboratory
Randy Bennett	Project Associate; Director of Special Education Services, Division of Educational Services, ETS

Management and Organizational Schedule

The organizational structure of the Institute is presented in Figure 4. As can be seen, the Institute is arranged hierarchically with a Director, an Associate Director, and a Coordinator for each Unit. Within each Unit, there are various projects, each of which is managed by a Project Coordinator. The Advisory Board and the Administration of the Institute report directly to the Director. The personnel in each of the positions are listed in Table 7. In addition, their title, function, location and percentage of time alloted to the function are included.

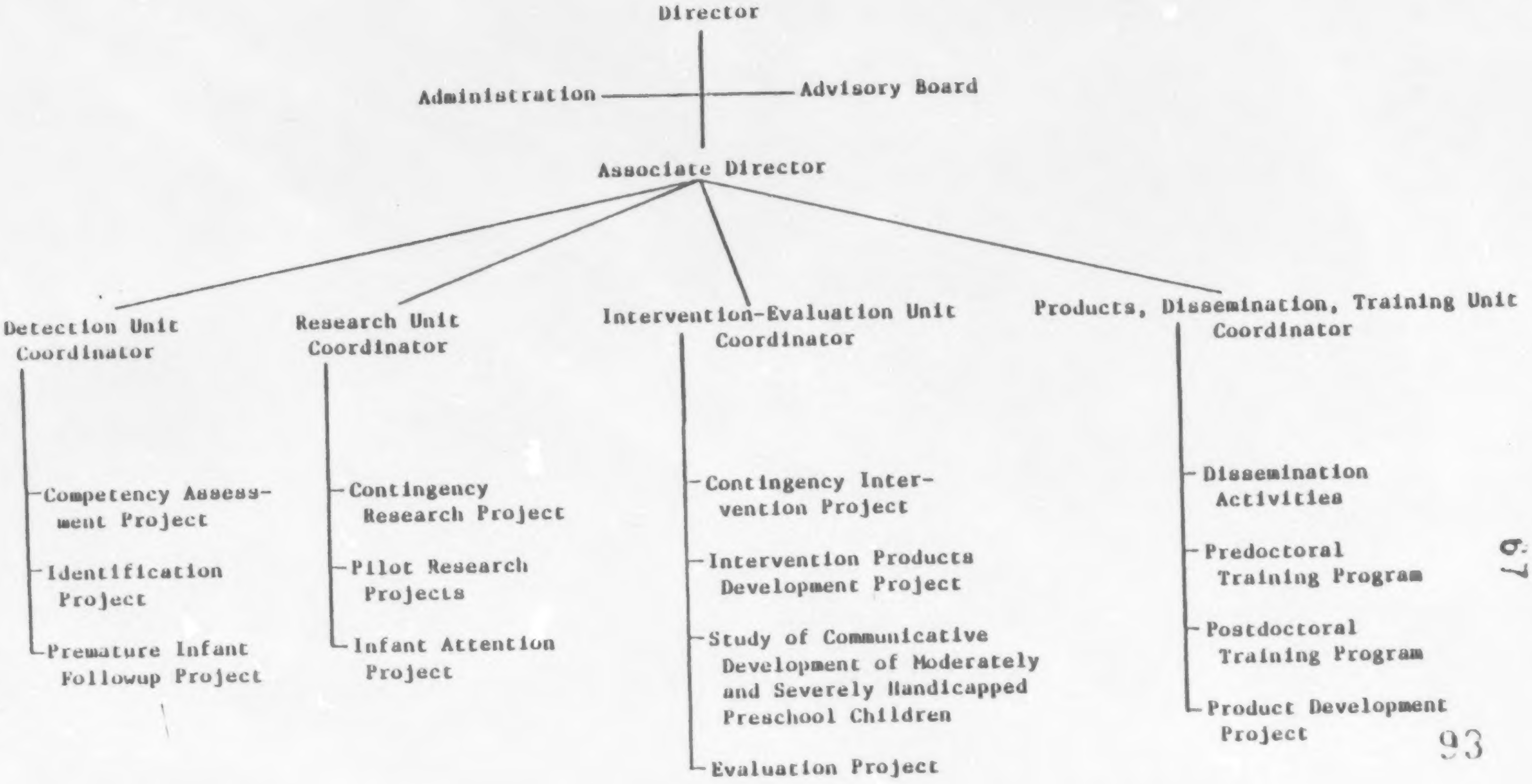
Director
Administration
Advisory Board
Associate Director
Detection Unit Coordinator
Competency Assessment Project
Identification Project
Premature Infant Followup Project
Research Unit Coordinator
Contingency Research Project
Pilot Research Projects
Infant Attention Project
Intervention-Evaluation Unit Coordinator
Contingency Intervention Project
Intervention Products Development Project
Study of Communicative Development of Moderately and Severely Handicapped Preschool Children
Evaluation Project
Products, Dissemination, Training Unit Coordinator
Dissemination Activities
Predoctoral Training Program
Postdoctoral Training Program
Product Development Project

Figure 4 Organizational structure of the Institute.

Table 7

Personnel and Their Functions in the Institute

Title	Name	Function	Location	% Time
1. Administrative				
Director	Michael Lewis	Administrative	New Jersey	15
Associate Director	Jeanne Brooks-Gunn	Administrative	New Jersey/ New York	35
Administrative Associate	Ann King	Administrative	New Jersey	20
Laboratory Technician	Erik Holme	Administrative	New Jersey	24
Secretary	Joanne Branham	Administrative	New Jersey	100
Secretary	Rosemary M. Deibler	Administrative	New Jersey	50
Sr. Research Assistant	Mary Enright	Administrative	New Jersey	25
2. Detection Unit				
Unit Coordinator	Nathan Fox	Administrative	New York	20
Identification Project Coordinator	Nathan Fox	Identification	New York	60
Director, Pediatric Service	Louis Cooper	Administration	New York	5
Neurologist (M.D.)	Neil Lombardi	Identification Project	New York	13
Neonatologist (M.D.)	Rita Fisher	Identification Project	New York	5
2 Research Assistants	Annie Hernandez Joe Lao	Identification Project	New York	100
Laboratory Technician	Clifford Savon	Identification Project	New York	15
Community Health Care Worker	Dulce Urena	Identification Project	New York	100

Table 7 (continued)

Secretary/ Community Health Care Worker	Jeannette Diaz	Identification Project	New York	100
Competency Assessment Project Coordinator	Jeanne Brooks-Gunn	CAP	New Jersey	15
Research Asst.	Lorraine Luciano	CAP	New Jersey	100
Secretary	Rosemary M. Deibler	Administrative	New Jersey	50
3. Research Unit				
Pilot Research Project Coordinator	Michael Lewis	Research Project	New Jersey	5
Pilot Study Coordinators	Lucille Weistuch	Research Project	New Jersey	50
	Margaret Bendersky	Research Project	New Jersey	50
	Carolyn McGuffog	Research Project	New York	50
Senior Research Assistant	Mary Enright	Research Project	New Jersey	50
Contingency Research Project Coordinator	Jeanne Brooks-Gunn	Contingency Project	New Jersey	20
Senior Research Assistant	Margaret Sullivan	Contingency Project	New Jersey	50
Infant Attention Project Coordinator	Michael Lewis	Attention Project	New Jersey	5
Research Assistant	Jim Rosso	Attention Project	New Jersey	100
Senior Research Assistant	John Jaskir	Statistician	New Jersey	100
4. Intervention-Evaluation Unit			New Jersey	
Unit Coordinator	Richard Brinker	Administrative	New Jersey	15
Contingency Intervention Project Coordinator	Richard Brinker	Intervention Project	New Jersey	30
Senior Research Assistant	Marge Sullivan	Intervention Project	New Jersey	50

Table 7 (continued)

Communication Study Coordinator	Richard Brinker	Comunication Project	New Jersey	20
Research Assistant	Joyce Gant	Intervention Project	New Jersey	25
Evaluation Project Coordinator	Richard Brinker	Evaluation Project	New Jersey	20
5. Training, Products, Dissemination			New Jersey/ New York	
Unit Coordinator	Michael Lewis	Training	New Jersey/ New York	5
Dissemination Activities	Richard Brinker	Dissemination	New Jersey	10
	Jeanne Brooks-Gunn	Dissemination	New Jersey	15
	Nathan Fox	Dissemination	New York	20
	Michael Lewis	Dissemination	New Jersey	10
Senior Research Assistant	Mary Enright	Dissemination/ Products	New Jersey	25
Research Assistant	Joyce Gant	Dissemination/ Products	New Jersey	25
Predoctoral Training Program Coordinator	Michael Lewis	Training Project	New Jersey	5
Predoctoral interns	Lucille Weistuch	Training Project	New Jersey	50
	Margaret Bendersky	Training Project	New Jersey	50
	Carolyn McGuffog	Training Project	New Jersey	50

D. FACILITIES/RESOURCES/HUMAN SUBJECTS

ETS was founded by the American Council on Education, the Carnegie Foundation for the Advancement of Teaching, and the College Entrance Examination Board, and chartered as a nonprofit corporation in December 1947 under the education law of the State of New York. The primary aim of ETS is to serve education through measurement, related services, and research.

ETS is governed by a 16-member Board of Trustees representing various levels and areas of interest in education and related fields. The trustees are responsible for determining ETS policies and objectives; for constantly examining and revising objectives in line with research results, new educational needs, and changing circumstances; and for maintaining balance among the "services, research, and other activities" specified in the ETS charter. Standing committees on finance and on research and development advise the officers regarding current performance and future directions.

Advisory committees composed of leading educators, researchers, test specialists, and experts in other fields help ETS define its special role in the educational community. Committees representing sponsors or users of ETS services help shape policies, plans, and procedures to their specific programs. Advisory committees participate in planning and evaluating major efforts in research, development, instruction, and assessment.

The main offices of ETS are on a 400-acre site on the outskirts of Princeton, New Jersey. Other offices are located in Atlanta, Georgia; Austin, Texas; Berkeley and Los Angeles, California; Evanston, Illinois; San Juan, Puerto Rico; and Washington, D.C.

Facilities at Princeton include a research center with special laboratories for the study of perception, infant behavior, and child care; five administration and office buildings; an operations center and computer complex for large-scale processing; a shipping center; and several service buildings. In addition, the new Henry Chauncey Conference Center is on the Princeton site. It contains an auditorium, four meeting rooms, a dining room, and 100 rooms for single or double occupancy to accommodate overnight guests.

ETS has approximately 2,000 permanent staff members. They include almost 600 professionals, more than 150 with the doctoral degree and an additional 200 hold the master's degree. Professional training is concentrated in education, psychology, and psychometrics, with representation from such associated fields as economics, sociology, the humanities, and the sciences. Supporting services are provided by specialists in computer technology, business management and finance, library sciences, and public information.

ETS is an equal opportunity employer and actively recruits staff members from minority groups.

The work of ETS falls into five major categories, each with its own specified objectives. They are:

> Research: To conduct research on measurement theory and practice, and on teaching and learning, in order to increase knowledge of the characteristics of learners, learning environments, educational processes, and the results produced by interaction of these factors.
>
> Development: To create new or improved measures; to explore their descriptive or predictive properties; to develop systems for the use of these aids; and to develop mechanisms which provide more efficient educational measurement.
>
> Programs of Measurement: To initiate, conduct, and improve practical programs of measurement and related services as required by educational and other institutions and agencies; to make such measures available as needed.
>
> Advisory and Field Services: To provide information and professional counsel to educators on a wide range of problems in educational measurement; to initiate field visits to help solve problems of measurement and evaluation.
>
> Instructional Programs: To develop and conduct programs for educators from the United States and other nations in order to assist them in solving problems of measurement, evaluation, and planning.

The dollar volume of ETS business for 1975-76 was about $63.0 million. Activities covered a broad spectrum, including extensive research and development as well as a comprehensive range of measurement services.

ETS develops and conducts a large number of testing programs. In addition to well-known national programs for academic selection at the high school, college, graduate, and professional levels, it conducts more than 50 programs in career and occupational assessment. Some programs are relatively small, with few candidates and limited operational demands. Others involve millions of candidates, many administrations each year, and complex processing operations.

Research projects at ETS are as varied as testing programs in size, educational levels, and areas of study. Basic research is conducted in the areas of personality and social behavior, human development, human learning and cognition, and psychometrics. Developmental and educational research ranges from preschool through postsecondary education, encompassing teacher behavior, measurement systems, school and college characteristics, educational planning, guidance, and careers. Many school and college programs at local, state, and national levels are evaluated by ETS. A special institute deals with urban and minority education, and a major new research program focuses on issues of policy and practice in educational finance.

Instructional activities and advisory services complement the total effort by promoting improved use of measurement products and research results.

The research divisions of ETS have at their disposal the extensive resources of ETS, including a research laboratory, with specialized equipment, highly advanced computer facilities, and a large library of educational and psychological materials. Members of the ETS professional staff with expertise in the areas of statistical analysis and test development are available for consultation and advice. In addition, Dr. Ledyard R Tucker, of the University of Illinois, and Dr. John Tukey, of Princeton University, serve as consultants on a retainer basis.

Each division has a supporting staff of research assistants, statistical assistants, and secretaries. Other support groups within the Research Divisions are available to assist in the various phases of a research study. The Data Analysis Division provides, through its Research Services Group, clerical and statistical assistance and, in addition, has a staff of systems programmers available to assist in this specialized area.

The proposed research would be conducted by present members of the Center for Assessment and Research in Human Development. The Center is composed of several research groups: the Infant Laboratory (Dr. Michael Lewis); the Center for Child Care Research (Dr. Irving Sigel); and the Human Development Group (Dr. Walter Emmerich). The structure of the Division is flexible, providing opportunity for intra- and intergroup cooperation on research studies as well as consultation regarding basic problems of conceptualization, research design, and anlysis.

Infant Laboratory. An infant laboratory was established in 1968 and includes a number of rooms with all the facilities necessary for presenting a wide variety of visual, auditory, or tactile stimuli, as well as the facilities and equipment necessary for recording such infant response systems as fixation (with a wide variety of measures), autonomic (heart rate, respiration, and GSR), behavioral (smiling, vocalization, and movement). Also included are TV monitoring and recording equipment and rooms for the observation of play behavior and social interaction.

The automated procedures in the collection, processing, and analysis of fixation and cardiac data allow us to process many more subjects than would be possible without such equipment. A Grass cardiotachometer and respirometer, a PDP-11 on-line recording system along with an IBM computer (360-44) are some of the equipment available for our work. Further, an infant stabilimeter, tape recorders, and event recorders allow us to collect much behavioral data.

Research Computer Capabilities. Facilities at ETS for on-line presentation of experimental interactive items include three systems within the Research Division:

(a) The research laboratory facilities include a Digital Equipment Corporation PDP-11/40 computer with 96k words of core, DEC tapes, a 256 k words fixed head disk, three 1.2 million word disk drives, line printer, communications interfaces, and several CRT terminals. This configuration is used for development, testing, data analyses, and customer demonstrations for SIGI, a computer based interactive educational and vocational guidance system.

(b) Also in the research laboratories is a Digital Equipment Corporation PDP-11/10 computer with 24k words of core, dual floppy disks and magnetic tape. This system is used to acquire and analyze experimental data from the infant and perception labs.

(c) In connection with ETS's role as independent evaluator for the NSF-sponsored field trials of the PLATO IV and MITRE computer-assisted instruction systems, ETS has pruchased a PLATO IV plasma panel display, and is leasing time on the PLATO IV system via telephone. The PLATO IV terminal, together with the TUTOR authoring language for PLATO, are well suited to the presentation of interactive items.

Data Processing Facilities

ETS's computer facility is comprised of some of the most powerful third generation data processing equipment available. There are two IBM 3031 central processors that execute a combination of commercial, scientific and teleprocessing applications. Each processor operates with full multiprogramming capabilities under the control of the virtual storage operating system OS/VS2 (MVS/Systems Extensions). The 3031s are configured with an aggregate of (10) million bytes of high speed monolithic memory, 32K bytes of buffer storage, a dual display consoles for improved operator interaction, two byte multiplexor channels and ten (10) block multiplexor channels for high speed tape and disk devices. Both systems share common access to the spool disks and input/output peripherals allowing for the dynamic balancing of the computer workload.

A wide variety of input/output peripherals are attached to both processors including thirty-two (32) magnetic tape transports, three (3) card reader/punches, and six (6) high-speed impact printers. Featured among ETS's printer configuration is the IBM 3800 non-impact laser printer that utilizes electrophotographic technology to achieve print speeds up to 20,000 lines per minute. Over 18,000 billion characters of online storage reside on 3330 Model II (200 million characters/disk) removable disk and 3350 (317.5 million characters/disk) fixed disk storage devices.[1]

File inquiry and updating, operating under the CICS software and CINCOM's total database subsystem, and application program development using TSO, is supported by over one hundred twenty-five (125) of the IBM 3278 cathode ray tubes. Remote batch entry is supported, via a minicomputer telecommunications control unit, by three (3) high speed computer work stations which are connected via high speed communication links. In addition, a variety of teletype-compatible terminals, including graphics display devices, are able to access the computer facility through dial-up and leased phone lines.

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[1] Machine readable data is protected from unauthorized access by the software access control facility - ACF2. ACF2 provides auditable techniques for detecting unauthorized access to confidential data.

The Key Entry department performs the bulk of their data entry work using three (3) CMC 1800 key-to-disk systems. These systems, each with a minicomputer-based operating system, are capable of performing various data editing functions, thereby relieving the burden from the central processors.

Three optical scanning machines transcribe and score virtually all test answer sheets and other scannable documents, such as registration forms for all ETS testing programs. These machines include an NCS scanner capable of scoring 6,000 sheets per hour, and two (2) Westinghouse Learning Corporation MRC scanners. The MRC scanners transcribe and score both sides of an answer sheet at up to 18,000 sheets per hour. The output of all the scanners is magnetic tape which is ready input to the central processors.

Protection of Human Subjects

The Committee on Prior Review of Research is responsible for ensuring that the rights of human subjects participating in ETS research projects are properly protected. It reviews projects at the proposal stage and periodically after initiation to ensure that provisions for the protection of human rights are fully implemented.

Of special concern to the Committee are procedures for informing subjects of the nature of the research and of the implications of their participation; for obtaining the consent of subjects or, where appropriate, their parents; and for maintaining the confidentiality of data collected during the execution of the research.

The present proposal has been reviewed by this Committee. The Committee will provide continuing review as the instruments are developed.

VI. STUDY AREAS

A. DETECTION UNIT

Overview of Detection Unit

The Detection Unit of the Institute involves two functions: (1) identification of potentially at risk children and (2) assessment of children with known handicaps. Detection has traditionally referred only to identification, and the large number of research projects and conferences devoted to this topic attest to our nation's concern for better and earlier identification procedures. However, detection also involves assessing the skills and competencies of the young child already defined as handicapped. The importance of these two functions-identification and assessment--cannot be overestimated. The following discussion speaks to the necessity for both functions.

Effective educational intervention for children with handicapping conditions and effective identification of these children is predicated upon certain inputs. One of the major inputs essential for educational planning is an analytic (in contrast to global)understanding of children with disabilities. While the study of characteristics of children with disabilities has expanded in recent years and has provided much valuable data, there are still areas which require better definition.

During the last five years there has been an explosion of research on infant development. New and ingenious techniques for studying infant behavior have been devised, and a substantial literature has accumulated on motor, cognitive, social, and emotional skills. The application of newer assessment procedures to the study of handicapped infants is quite limited. Thus, there are no data on disabled infants comparable to the relatively new data on the "normal" infant. The recent work on the handicapped infant (e.g., The Exceptional Infant, Vol. 3: Assessment and Intervention, Friedlander, Sterritt, & Kirk, 1975; and Screening and Assessment of Young Children at Developmental Risk, Meier, 1973) suggests that developmental assessment still depends very largely (and sometimes exclusively) upon such instruments as the Gesell Developmental Schedules, the Bayley Scales of Infant Development, and the Denver Developmental Screening Test. This appears to be true whether assessment is done for group comparison research (e.g., Dicks-Mireaux, 1972; Share, 1975) or for educational planning (e.g., Hayden & Dmitriev, 1975). While these instruments provide valuable data for educational planning, they may in fact have too definitive a role in educational programming (e.g., Page's, 1975, criticism of the Milwaukee Project for high risk infants for teaching to the Gesell Developmental Schedules) and they do not provide as comprehensive a picture of the child's functioning as the available techniques would allow. It is perhaps the easy, almost automatic, applicability of the available instruments, combined with the lack of research attention, which has retarded the extension of newer types of assessment techniques to handicapped infant populations. Special educators cannot afford to do without additional information, since the children with whom they deal need special support in developing normal functions. This need has been recognized by both research and program members of infant intervention projects (cf. Nielsen et al., 1975).

Another notable expansion has taken place during the past three or four years, namely, the growth of intervention programs for disabled infants (including federal, state, county, national organization--e.g., United Cerebral Palsy--and institutional programs). These programs serve a vital need and are likely to continue to grow in numbers, particularly in light of the interest of various agencies in these programs* and in light of the recent reluctance of some state institutions to admit infants. The pressing task before those who work with atypical infants is to develop a sound theoretical and practical basis for educational and therapeutic interventions (Nielsen et al., 1975, p. 223). Again, these needs are best served by a comprehensive and analytic picture of the young child's functioning. This viewpoint is exemplified by Robinson and Robinson's (1970) statement that there should be "a trend toward specialized curricula to deal not only with vocational and social goals but also with personality and learning problems of more selected groups of children, based on understanding of specific handicaps and specific needs" (p. 644).

In summary, better identification and assessment are predicated on a complete understanding of the development of both normal and atypical infants, an understanding that would be provided by the research function of the Institute. In addition, identification and assessment are directly related to the intervention, by providing the basis for individualized curricula strategies. Three different projects will be conducted: the Identification Project, the Competency Assessment Project, and the Premature Infant Followup Project. Each will be discussed separately.

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*At least 12 state education departments are authorized to offer services to handicapped children from birth onward (Hobbs, 1975).

1. Identification Project:

Detection of Handicap in a Population of 'At Risk' Infants

Overview of Identification Project

Martha M. delivers an 1,800 gm baby girl after only a 28 week gestation. The baby, after initial emergency care, seems healthy but remains in the Neonatal Intensive Care Unit in an isolette for the next 8 weeks. Martha comments, upon taking her baby home, that she feels somewhat distant from her child, as if she does not "know" her. At the 3-month check-up, the baby is not smiling to her mother's face. Martha still feels distant from her child and also feels something is wrong. The physician can find no medical aberrant signs and comforts Martha that her child is fine. Martha leaves unconvinced and unsatisfied. By age 3, the young child is clearly cognitively, as well as socially, delayed.

Betty W., after an uneventful pregnancy, goes into labor and problems arise. Her labor lasts 30 hours and the infant seems stuck in the birth canal. An emergency ceasarean is performed. The infant has initial Apgar scores of 1 and 3, is incubated, and is kept on a respirator for 2 weeks. After the baby is discharged, he grows slowly and is listless. The pediatrician can find nothing physically wrong with the child, but by 9 months he is still not sitting or reaching for toys, and by 2 years he is quite uncoordinated, slow in language, and highly distractible. At age 3, his physician finally has him examined by a neurologist. Diagnosis: minimal brain dysfunction.

The above cases highlight the major problem in developmental pediatrics -- how to identify infants as at risk for dysfunction. In this project, we are specifically concerned with infants who are defined as at risk for specific medical reasons: low birth weight and premature — appropriate for dates (AFD, herein), and term infants who have undergone one or a number of severe medical complications. Both categories of infants are at risk for later physical or mental dysfunction — and there are important etiological and prognostic differences for each group.

The outlook for both categories of at risk infants has steadily improved over the last 10 years. The high incidence of major neurological or physical handicaps associated with both low birth weight (AFD) and sick term infants has decreased with modern perinatal care. Although major handicaps are less frequent, reports of minor physical and cognitive handicaps, the result of either low birth weight or perinatal complications, continue to accumulate (Davies & Tizard, 1975; Field et al., 1979; Friedman & Sigman, 1981). The prognosis of minimal brain dysfunction, learning disabilities, or school problems in both populations remains high. At the same time, the number of infants who have suffered severe perinatal trauma or are very LBW and who survive, because of advanced medical technology, has also increased. Thus, increasing numbers of babies at risk for later dysfunction are being saved each year (Hunt, 1981). In addition, the majority of these infants are born to families from lower economic strata (Drillien, 1964). Such conditions may serve to increase the probability of dysfunction (Sameroff & Chandler, 1975). That is, in all probability, an at risk infant born to a middle or high income family will fare better than an infant with identical history born to a poor family.

The followup studies of low birth weight and sick term infants exhibit a similar pattern. Initial reports about the developmental outcome were grim. High percentages of infants seemed to function below average and exhibited signs of CNS involvement. Worse, significant percentages of both very low birth weight infants and infants suffering perinatal trauma ended up with sensory impairment and neuro-motor handicap. However, more careful study of these populations has shown a different picture. Specifically, longer followup of the infant population that had suffered perinatal trauma (e.g., asphyxia at birth) found few differences between these infants and matched controls by school age. However, most studies of high risk infants have examined only gross measures of intelligence (IQ tests) in tandem with neurological examination (Weiner et al., 1968). Few, if any, have attempted to characterize the environment of the high risk infant, let alone the possible effects of interaction between environmental variables and psychological competencies. A few studies have found differences in maternal attitude and caretaking style between normal versus low birth weight sick infants (Barnett & Miller, 1973; Field, 1977). No research, however, has attempted to document the effect such attitudes may have on later school performance or on social development. There are, however, a number of studies which have found school children who were premature to be more dependent on adult care, more inhibited, and more defensive, all of which may be associated with parental attitude (Bjerre & Hansen, 1976). Finally, the major studies of at risk infants have attempted to predict later social and intellectual behavior but, for the most part, they have failed to do so. Neurologists are wary to commit themselves to differential diagnosis for fear that suspicious symptoms in infancy may disappear in early childhood. Followup studies, using only the most general measures of development, have failed to find any medical or psychological variables which are predictive of later functioning. Only social class factors have been found to predict later outcome (Stewart & Reynolds, 1974; Broman et al., 1975).

In sum, then, medical science is keeping alive a number of different groups of infants, the very low birth weight and the very sick, who may be at risk, both physically and mentally, for possible handicaps that range from gross CNS dysfunction to poor school and social behavior. Prospective research with these infants has failed to characterize the environment into which the infants were born, nor account for the interaction of environmental (parental and economic/social) factors with psychological competencies. In addition, predictive and outcome measures have been of a general nature and have not been attuned to subtle CNS dysfunctions that seem to appear in these children. For these reasons, we must conclude that previous research has, in general, failed to identify the at risk infant nor has it been able to detect dysfunction early in life that may relate to later functioning and performance.

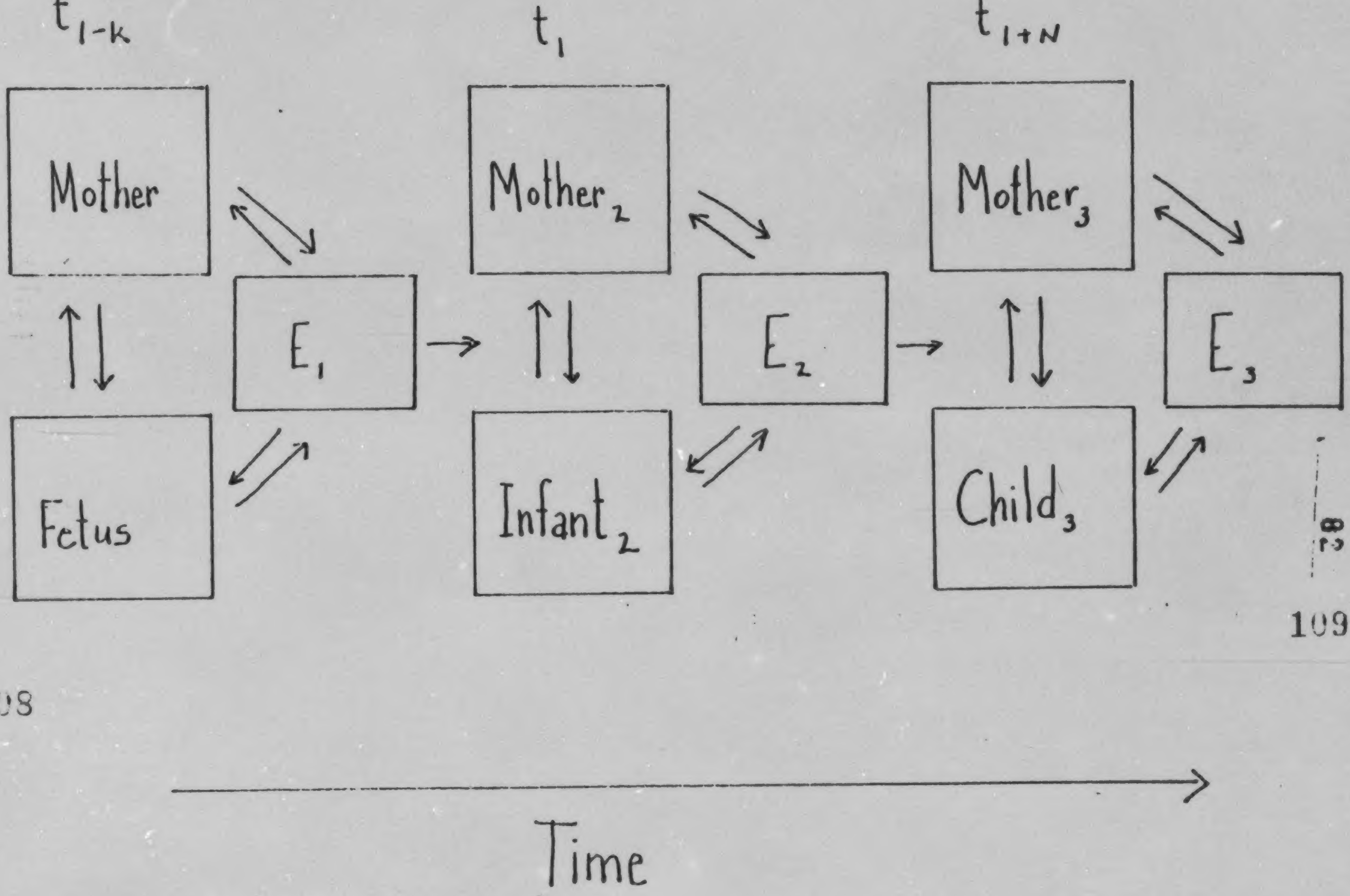
In contrast to previous followup studies, the Identification Project will attempt to structure research so as to engage the problems neglected in the past. Our goal is twofold; first, to identify which infants are at risk for later dysfunction, and second, to develop the means for detecting early disability in such a population. To accomplish this goal we will employ measures which describe the characteristics and competencies of the infant as well as the environment in which he/she exists, and examine the interaction of environment and competencies across time. A detailed analysis of the interactive process will allow us to identify the at risk infant and to detect early, subtle dysfunction in order to predict later behavior and performance.

Domains of Study

We have chosen five domains or areas of functioning which correspond to our theoretical position, emphasizing a transaction between biological and environmental variables. We have chosen a variety of measures from each domain in order to obtain a representative sample of the infant's behavior. The five areas (medical, neurological, perceptual-cognitive, socioemotional, and infant characteristics) allow us to investigate the interaction of environment and behavior and the changes in the interaction over time. Our study is prospective in nature. Since biological and social status do not remain static over time, a longitudinal design allow us to study change over time. The model for our detection plan can be seen in Figure 5.

The outline in Figure 5 emphasizes the constantly changing relationship between mother, infant and environment, as well as the change, over time, of each of these elements. Thus, our model begins at time t_{1-k}, which is some period while the mother is pregnant. We will gather data, albeit retrospectively, on the status and the environment of the mother (and indirectly the fetus). We are aware of the effect maternal and environmental status may have on the infant. The bi-directionality of the arrows between mother, fetus and environment emphasizes this point. At birth, t_1, the environment and mother's and infant's status have undergone change, thus producing a new set of circumstances which are partly the consequence of previous t_{1-k} interactions and partly due to experience at that time. Thus, an uneventful pregnancy may be disrupted at birth, t_1, by complications which might tend to effect future functioning. Detection must account not only for changing environmental states but also for current interaction. With our model, we move forward along t (time) so that at each future testing date, t_{1+n}, we are aware of measuring maternal, infant and environmental states which are themselves new and also the product of previous interaction. Thus, mother at time t_{1+n} is a different person than at time t, as is the environment with which she interacts. As she changes so does her environment and vice versa, so that again that interaction is marked by bidirectional indicator.

A final note about the model in regard to selection of measures for detection. Since this model is based on an assumption of constant change, and on an assumption that previous interaction will somehow affect future functioning, the measures from each domain must reflect two characteristics:



Transactional Model of Development

Figure 5

first, they must be different in character across time reflecting change and, second, they must be related in some way across time to reflect the ultimate relationship between past interaction and future performance. An example of the use of this conceptual framework in choice of measures can be seen in the neurological domain. Neonates will be examined to determine an earlier indicator of hemispheric specialization (postural asymmetry). Three-month-old infants will be studied to determine the functional significance of hemispheric lateralization (dichotic listening). Pre-school children will be examined to to determine the relation of laterality to motor behavior (neuromotor tasks). Thus, across time there is a relationship within a domain between early measures of a behavior and later competencies. This relationship across time is not necessarily restricted to a single domain. The underlying competencies we examine in neurological function will obviously be related to cognitive performance. Again, as an example, the issue of laterality of CNS function may provide an adequate illustration. Measurement of cerebral specialization has been related to sensory integration. Thus, our measures in the perceptual-cognitive domain may, in fact, provide useful and additional data to the outcome measures in the neurological domain.

This cross-fertilization of information acquired from measures in one domain to measures and outcomes in a second is, in part, our rationale for sampling measures in a number of areas. We believe that use of measures from multidomains will allow us to use data from each in a cross-modal fashion, to answer the complex questions involved in prediction.

Neurological Domain

There are a number of important issues with regard to neurological testing measures. One of the first is to design a neurological exam that incorporates the knowledge of pediatric neurology with understanding of the developmental and psychological status and competencies of the child. Such an exam will allow us to identify infants as being suspect or at risk for CNS dysfunction. However, our neurological measures will go beyond simple determination of gross CNS function. They will attempt to investigate the issues of hemispheric specialization as it relates to motor and cognitive activity. As was noted previously, research on high risk infants has noted the occurrence of learning and motor disorders commonly linked under the category of minimal brain dysfunction. While the incidence of gross CNS dysfunction has decreased in populations of high risk infants, the number of studies reporting learning disabilities among school age populations of once high risk infants continues (Stewart & Reynolds, 1974). Thus, we have designed a number of measures, beginning in infancy, which will allow us to investigate the etiology of MBD or perceptual motor dysfunction. The neurological measures include a basic examination at each age and specialized indices (postural asymmetry, dichotic listening, neuro-motor tasks) to examine laterality.

Medical Domain

Any model of research interested in first identifying the degree of risk of a particular infant must take into account the biological trauma that an infant may suffer in utero or perinatally. Thus, we are concerned with isolating factors involved in prenatal care, obstetrical complications, perinatal illness as well as subsequent medical problems that may arise as the child grows, all of which may affect his interaction with the environment. The purpose of the initial medical measures chosen will be to determine if a particular infant may be classified as at risk for handicap. We have chosen the Obstetric Complications Scale, Postnatal Complications Scale, and Pediatric Complications Scales (Littman & Parmalee, 1978) which give a cumulative weighted score and allow for determination of risk status. In addition, infants will be examined by a medical team during each follow-up session. We will record any medical problems, complications, or treatment that may arise over the course of study. While our research model does not accept a medical model as the basis for detection, we do believe that medical state of the organism affects environmental condition as well as is affected by it.

Perceptual-Cognitive Domain

Most studies of at risk infants have used only the most general of indices in evaluating intellectual functioning. The basis for their research essentially rested on two principles: first, that infant psychometric testing was predictive of later mental functioning and, second, that the young infant was essentially a non-interactive, brain-stem organism. Recent research, however, seems to contradict both these assumptions. First, the level of prediction from infant tests to later IQ scores is modest (McCall, Appelbaum, & Hogarty, 1973) indicating that these psychometric examinations are of little use in detecting future behavioral disorders (except in the most extreme cases). (For a more detailed analysis of the relation of infant testing to later behavior, see Fox, 1978) As to the second assumption — the infant as a nonresponsive, brain-stem organism — the weight of current data on the information processing capabilities of the neonate (Haith & Campos, 1977) and the data that describe the infant as an active and competent interacting person (cf., Lewis & Rosenblum, 1974) clearly negate that description of the infant. Instead, the lack of predictability of infant tests and the new conception of an active infant necessitate a re-evalutation of the information processing capacity of the infant. Lewis (1975) has been working on this premise for a number of years and has developed a task measuring visual attention during early infancy as an alternative to the psychometric testing. This task will serve as the core of the perceptual-cognitive measures. In addition to our measurement of both visual and auditory attention, we will also investigate sensory-integration, memory, concept formation, and language development in an attempt at covering the range of cognitive abilities the infant and young child possesses.

Socioemotional Domain

As we have emphasized in describing the range of the different domains, previous studies of at risk infants and children have not adequately characterized the environment. Basic to our detection research strategy is the conception of the environment as an active changing factor that influences the course of development.

Essentially, the socioemotional domain may be divided into two distinct components: measurement of the child's social development and measurement of the environment via examination of the child's social interactions. Our measures of social development include development of affective responses, self recognition, and the infant's social responses (via the mother-infant interaction). The social environment will be examined via the mother-infant interaction, detailed interviews with the mother regarding her attitudes and expectations, observation of mother-infant feeding, and visiting chart and maternal teaching style. These measures should give us an indication of how the child's environment affects risk state.

Infant Characteristics

Two types of infant characteristics will be measured: infant temperament and intellectual functioning. Infant temperament involves the behavioral style of the infant in terms of such factors as persistence, reactivity, adaptability, and so on. Individual differences in behavioral style factors seem crucial to assess since they affect others' perceptions of and interactions with infants. An "at risk infant with certain behavioral style factors may be severely affected by the interaction of temperament and environment (cf. Thomas, Chess, & Birch, 1970). General standardized, intellectual tests of development have been given by all predictive and at risk follow-up studies. For comparative purposes, we will administer the Brazelton Neonatal Behavioral Assessment Scale in the neonatal period, Bayley Scale of Infant Development Mental at two years of age, and the Stanford Binet Test of Intelligence at three years of age.

Subjects

Target Population

We have chosen as the target population three groups of infants who seen to be at risk for motor or neurological handicap, ranging from cerebral palsy to minimal brain dysfunction and learning disabilities. The three groups are healthy and sick preterm infants and term infants who have undergone birth asphyxia. Preterm infants meet criterion #1 listed below while sick term infants meet criteria #'s 2, 3 and 4.

Criteria:

1) Gestational age less than 37 weeks and/or birth weight less than 2200g. (Includes both AGA and SGA low birth weight infants).

2) Apgar score of 4 or less at 5 minutes.

3) Evidence of metabolic acidosis, i.e., ph less than 7.2 for the first hour of life.

4) Any baby who needs oxygen for more than 4 hours.

The population of premature, low birth weight infants is in itself not a homogeneous one. Infants may be born prematurely and low in weight yet suffer no subsequent medical complication. On the other hand the AFD low birth weight baby may suffer from Respiratory Distress Syndrome, need extended respiratory assistance, and be susceptible to hyperbilirubinemia and a host of other medical insults. Thus, "healthy" premature low birth weight babies and infants who are premature, low birth weight but undergo subsequent medical trauma will both be seen. The average stay for both subgroups of low birth weight infants in the Intensive Care Unit is three weeks, with subsequent stay in the nursery averaging around two weeks. The third at risk category are those term infants who at birth suffer some perinatal insult but are not premature. As we have defined it, infants who have undergone perinatal anoxia will be included. Average stay in the Neonatal Intensive Care Unit for these infants is three weeks.

Control Group

A sample of normal term infants matched for sex and socioeconomic status will serve as a control group. This sample will be collected from the nursery at the Roosevelt Hospital, a large, urban, inner-city hospital, with approximately 2500 births per year.

Protection of Human Subjects

The Committee on Prior Review of Research is responsible for ensuring that the rights of human subjects participating in Roosevelt Hospital research projects are properly protected. It reviews projects at the proposal stage and periodically after initiation to ensure that provisions for the protection of human rights are fully implemented.

Of special concern to the Committee are procedures for informing subjects of the nature of the research and of the implications of their participation; for obtaining the consent of subjects or, where appropriate, their parents; and for maintaining the confidentiality of data collected during the execution of the research. The present proposal has been reviewed by this Committee. The Committee will provide continuing review as the instruments are developed.

Schedule of Testing

Table 8 outlines the testing schedule. Infants were examined during the neonatal period (defined as that period after birth and before release from the hospital). Testing began one week after birth or as soon as the infant was weaned off a respirator. Since individual infants need more or less assistance in breathing, the first testing date necessarily varied between subjects. Permission from the resident neonatologist, as well as parents, was obtained before testing.

Well baby care is offered to all participants in the study. Infants needing additional care are assigned proper follow-up clinic at the Roosevelt Hospital. The out-patient clinic is currently set up to follow, medically, infants of low birth weight who were admitted to the Intensive Care Unit.

Table 8

Testing Schedule: Identification Project

NEONATAL PERIOD	3 MONTHS VISIT	8 MONTHS VISIT	12 MONTHS VISIT	24 MONTHS VISIT
Domains				
NEUROLOGICAL				
1) Apgar 2) Postural Asymmetry 3) General Assessment	1) General Assessment 2) Dichotic Listening Task	1) General Assessment	1) General Assessment	1) Neurological Assessment 2) Handedness & Bi-Manual Coordination
MEDICAL				
1) Dubowitz 2) Obstetric Complication Scale 3) Postnatal Complication Scale	1) Pediatric Complications Scale	1) Pediatric Complications Scale	1) Medical Examination	1) Medical Examination
PERCEPTUAL-COGNITIVE				
1) Auditory Habituation	1) Visual Attention Task 2) Sensory Integration Task	1) Sensory Integration 2) Visual Attention	1) Visual Attention Task	1) Visual Attention 2) Receptive Language 3) Expressive Language
SOCIO-EMOTIONAL				
1) Mother-Infant Observation (feeding) 2) Parental Visit Chart 3) Parental Interview	1) Mother-Infant Interaction 2) Parental Interview	1) Eliciting Affect 2) Parental Interview	1) Mother-Infant Interaction 2) Eliciting Affect 3) Parental Interview	1) Mother-Infant Interaction 2) Parental Interview
INFANT CHARACTERISTICS				
1) Brazelton 2) Temperament Interview	1) Carey Questionnaire	1) Bayley Exam	1) Carey Questionnaire 2) Bayley Exam	1) Bayley Examination

Location

The detection study is taking place at the Roosevelt Hospital in New York City. The Roosevelt Hospital is a 595 bed general hospital which has served the mid-westside of Manhattan for over 100 years. The Hospital, a voluntary institution, is a major affiliate of the College of Physicians and Surgeons of Columbia University, linked by written agreement between the Trustees of the Hospital and the University.

The Roosevelt Hospital provides primary care to the very heterogeneous neighborhoods with approximately 250,000 residents living from 38th street to 94th street west of Fifth Avenue and to a million people who come into the area each day. The area is a center for commerce, culture and the mass media. "Broadway", Lincoln Center, the three major television networks and the New York Times are within a few blocks of the hospital. No municipal hospital is located on the west side of Manhattan.

The Roosevelt Hospital's physical plant is appropriate to its mission of primary care, selected tertiary care, training of students of all levels in the health sciences and basic and applied research. The areas particularly concerned in the detection study include:

1) A newborn nursery floor with 40 bassinettes for healthy newborn infants and a special care nursery for 12 newborns in need of more intensive observation and care. Fetal monitoring is standard practice and the special care nursery is equipped in keeping with modern standards.

2) A comprehensive pediatric ambulatory care facility, partially supported by federal Title V Children and Youth Project funds, which accommodates up to 45,000 visits per year.

The Roosevelt Hospital Administration has given a large, vacant medical ward, adjacent to the newborn nursery, to the Infant Laboratory. Rennovation for this lab was completed July 1, 1979. The new infant lab has two play areas with observation room access and video/cuditory hook-up, office space for research fellows, waiting area for mothers and their children, and attention and instrument rooms. It also houses pediatric examination rooms for developmental consultation and follow-up.

How to Read This Planning Design

As seen in Table 8, the measures to be administered over the course of the detection study can be divided into five domains: neurological, medical, perceptual-cognitive, socio-emotional, and infant characteristics. A number of measures from each domain are administered at each of the testing dates. The following proposal is thus divided into five sections - one for each domain. Within a section each measure is included with a brief description of the rationale for its use and the procedure for its administration. At the heading of each measure are the testing dates for its administration. Table 8, then, should serve as a general schematic for the detection proposal and should be referred back to for a general overview of domain, measure and testing date.

Statistics

Statistical analyses on the group data includes analyses of variance (to test development patterns among groups and skills), multivariate analyses of variance (to test group differences with a large number of measures), correlational analyses (to examine the relationship among skills), factor analysis (to further examine relationships among skills and groups), and cluster analyses (to examine the functional similarities among individuals).

Outcomes

Four different outcomes are anticipated: identification, detection, prediction, and validation. The first outcome of this study is to identify those factors (medical or neurological) that may facilitate the classification of an infant at risk for later developmental dysfunction. Too often, single medical events have been used as indicators of future risk, and results have not found significant relationships between these single factors and later functioning. Thus, it is important to identify the cluster(s) of factors which may contribute to later developmental dysfunction. The second outcome is to detect, as early as possible, handicapping conditions that are the result of at risk medical/neurological status. We administer the broadest number of measures with the most testing sessions during the first year and particularly during the first months of life. Once measures have been found reliable in detection, those children so recognized as having impairment can be referred for proper intervention.

A third major outcome of the study is prediction of future behavioral functioning based on early measurement of behavior. Specifically, this study is longitudinal in nature so that we may analyze the relationship of early behavior response to later functioning. Those measures or indices which are useful in predicting later behavior will obviously be of great importance in assessing different handicapped populations.

Finally, validation of the measures involved and more generally, of the theoretical model on which the Institute research is based, is the last outcome of this study. Measures that are not isolated in themselves to the infancy period, but have obvious correlates with later behavior, are being used. In brief, we are searching for a consistency across time, a cross-age validity to our measures.

As stated throughout, the major emphasis of the detection measures will be an explication of the environment. We do not believe that knowledge of cognitive deficit in infancy can by itself predict later functioning, nor do we accept the assumption that social-economic status is the best predictor of later functioning. Rather, we have set our to validate a model of development which states that only by documenting the interaction of environment and competency can one understand behavior. Thus, we intend to administer measures, such as infant-mother interaction, which explicate the environment. Our hope is that the relation of social and cognitive measures will allow us a certain degree of prediction of future behavior as well as permit early detection for more beneficial intervention.

The Clinical Domains: Neurological and Medical

Overview

Traditionally, the two areas which have been investigated in relation to identification of the at risk infant are the neurological and medical. Most clinical research has attempted to detect insult to the central nervous system that may be a result of some pre- or perinatal condition and that may result in some motor or intellectual deficit. An example of such work centers on research into the causes and effects of cerebral palsy. A good deal of research has investigated the possible trauma which may result in some degree of paraplegia (Windle, 1963), and the effect such CNS insult has on intellectual functioning. The techniques of neurological detection have traditionally centered around standard examinations.

The second traditional area of investigation involves the analysis of medical data in terms of later physical health and intellectual functioning. Essentially this work falls into two categories: medical indicators that may be indicative of CNS functioning and general medical state that may be related to general cognitive performance . An example of the first category is the relationship found between hematocrit count and cerebral hemorrhage. A well documented relation between this medical index and CNS insult has led to careful monitoring of hematocrit count in neonatal Intensive Care Units. The importance of the second category of medical data may be illustrated by recent research which has found that medical at risk indicators in the neonatal period are not as useful for detection/prediction of later functioning as is medical status in the first year of life (Parmelee & Michalis, 1975). Thus, it is not so much any specific piece of medical data that seems important in detecting and classifying at risk situations as is general medical state.

Underlying both the neurological and medical domains is a model of development that we have termed the medical model. In this model, early indices of insult or disease are believed to be directly related to later status. This model of the organism, while helpful in organizing neurological and medical information, does not take into account the interaction of early deficits with environment and does not allow for an active and dynamic infant, who,only through interactions with the world, develops.

Neurological Domain

The majority of prospective studies of either low birth weight (AFD) infants or sick, at risk, term infants have focused on neurological insult as the important indicator of later functioning. In general, however, early neurological assessment has failed to be of predictive value. One reason may be the transient nature of perinatal insult. Neurological warning signs often found in at risk infants disappear in early childhood. A second, and relevant reason, may be the nature of the neurological examination. Often, these examinations assess the absence or presence of reflex responses. Recent evidence, however, speaks to the need for examination of the qualitative response of a motor action. Research has shown the newborn to be more than merely a brainstem reacting organism--but one in whom higher brain centers inhibit or facilitate reflex responses. A third reason involves the problem of state. Infants, during the course of examination time, pass through a number of different states--each of which affects the organism's reaction to stimuli and reflex responsivity (Prechtl, 1976; Parmelee & Michalis, 1975). Thus, any newborn's examination should naturally take into account state variables.

The purpose of measuring the neurological domain is threefold. First, we are interested in developing indices of evident neurological problems at each testing age. Second, since we will examine children with neurological measures at each age, an evaluation of change over time may help us to determine the evolution of consequences of previous trauma. Finally, the early measurement of neurological intactness may act as an indication of long-term prognosis for the at risk subject.

Neuro-Developmental Examination (Birth to Two Years). The neuro-developmental examination in Appendix A, Section 1, has been developed specifically for the Identification Project. It is administered at each assessment date. Infant responses to a number of environmental stimuli and reaction to a number of reflex responses across different infant state periods will be examined. The examination that is used was developed by the Detection Unit to include both important CNS reflexology and crucial notions about early infant development. The exam combines items from the Graham et al. (1957) examination, Gesell Motor Assessment (1962), and the Prechtl examination (1976). The exam has been developed for administration across the first three years of life and will be given at each testing session by the child neurologist. Each exam will be scored and the infant classified as normal/suspect/abnormal. (See Appendix A, Section 1)

Apgar (Neonatal Period). The apgar is a measure of initial detection of possible birth trauma or complication. This "instant physical" assesses the cardiopulmonary and neurologic function of the newborn. The scoring scale is made up of five items (heartrate, respiratory effort, muscle tone, reflex inability and color) each of which is given a score of "0", "1", or "2" (Apgar, 1953). The scale is given twice, one minute after birth and again five minutes postpartum. An infant with an Apgar score of 0 to 2 is considered asphixiated until proven otherwise (Klaus & Faranoff, 1972) while infants with an Apgar score of 3 to 6 at the one minute score probably have had mild to moderate asphyxia. The second (5 minute score) is considered the more important indication of prenatal distress (Drage & Berendes, 1966) and infants who continue to have low Apgars or drop in score are considered by neonatologists to be at risk (Klaus & Faranoff, 1972). The five minute score has been correlated with neonatal acidamia as a measure of oxygenation (James, 1964) and with infant mortality in the first year (Apgar, 1966). Drage et al. (1966) found that the five minute Apgar score predicted abnormalities in neurologic states, motor development, muscle tone and prehensile grasp.

As part of the National Collaborative Study, data on 350 children with five minute Apgar scores and 8 month Bayley mental and motor scores were categorized at the medical examination as normal, suspect or abnormal in their mental development. They found a statistically significant relationship between Apgar and the Bayley tests. Mean mental and motor scores were significantly lower for infants with Apgar scores of 0 to 3 than for those with scores of 7 to 10. Mean mental, but not mean motor, scores for infants with Agpars of 0 to 3 were significantly lower than mean mental scores for infants with Apgars of 4 to 6. Finally, Apgar scores and Bayley mental and motor scores were significantly correlated in the total sample, and the mean Apgar score of children classified as abnormal was significantly lower than infants classified in the suspect or normal groups. Thus, the Apgar seems to give important information about earlier status. The Apgar was collected at one and five minutes after birth.

The five signs, the characteristics of each, and the scoring system are summarized below:

SIGN		SCORE	
	0	1	2
Heart Rate	Absent	Below 100	Over 100
Respiratory Effort	Absent	Weak, Irregular	Good, Crying
Muscle Tone	Flaccid	Some Flection of Extremeties	Well Flexed
Reflex Irritability (Catheter in nose)	No Response	Grimace	Cough or Sneeze
Color	Blue, Pale	Body Pink, Extremeties Blue	Completely Pink

Postural Asymmetry (Neonatal Period). Many patterns of normal behavior, ranging from speech and reading to fine motor coordination, seem to require stable patterns of lateral differentiation. Research on cerebral function has indicated that lateralization of function during the neonatal period may represent a sensitive indicator of neuro-behavioral organization and one which is of more than minor importance for the subsequent organization of cortical behavior. Recent work has indicated that the normal human newborn is asymmetrical in his responses to stimulation. Turkewitz et al. (1969) found ipsilateral head turning responses to be more readily elicited by stimulation of the infant's right side than by stimulation of his left. Furthermore, although contralateral responses are infrequently made to stimuli appearing at either locus they are significantly more common when the stimulus appeared at the infant's left side.

Significantly, the head turning measure was sensitive in detecting differences in lateral organization between groups of low and high Apgar score infants. High and Intermediate Apgar groups made significantly more responses to stimuli at the right than at the left side, whereas infants in the low Apgar group exhibited no such lateral differences in responsiveness. Turkewitz et al. (1966) speculate that early lateralization of responsiveness may result in the extablishment of a leading side in dealing with the environment which, either directly or via a learning process, may result in the increasing premanence of a lateral preference. Obviously, if the proposed developmental sequence is modified by a change in state of early lateralization, the child may be in a particular risk state.

It is, therefore, important to note that Gardner et al. (1977) found that prematures had at the conceptual age of 39 weeks a significantly weakened turning bias than normal term infants. Such a finding is also consistent with other work which has found that during childhood, prematurely born individuals are likely to be less stable and consistent in their preferred lateral usage than are individuals born at term (Eaves, et al., 1970). Interestingly, reports on the sequelae of low birth weight infants report a high percentage of children at age six with spatial and/or perceptual problems. While no claim can yet be made for causal link, it may be that some type of abnormal patterns of lateralizations in these children - a pattern obvious from infancy - may be contributing to later cognitive deficit.

Since the head position bias of the infant contributes to lateral differences in response to stimulation (Turkewitz et al., 1966), it therefore seems important to observe such postural asymmetry in our risk population and to determine the degree of individual differences in position bias and subsequent lateralization in the sample.

To examine the development of lateral differences in posture, we observe head position of the infant for one hour, at 15 minute intervals. All observations are made while the infant is in its own bassinet or isolette. A second type of observation involves assessing infant bias following placement in a midline position. The infant is placed in a supine position with his head held in the midline by an experimenter. The head is to be positioned with the bitemporal region between the experimenter's thumb and forefinger. As soon as no differential pressure is felt on the restraining fingers, the head is released and direction of the first head turn noted. Fifteen minutes after release, head position is again noted.

Results of this particular study highlight the importance of examining issues of both illness and maturity when assessing premature infants. Our data reveal that maintenance of a right postural asymmetry is present as early as 34 weeks conceptional age and is not disrupted by postnatal illness. Lateral head turning after midline placement was evident as early as 36 weeks conceptional age but was disrupted by physiologic condition. Infants who had experienced RDS had poor muscle tones and did not assume the head right position even at 39 weeks conceptual age. These data argue that lateral responding may be affected by illness and that studies of preterm populations must evaluate postnatal medical condition when assessing both the short and long term outcomes of lateral asymmetries.

Laterality-Dichotic Listening (Three Months). One of the deficits that has been known to occur in pre-school children who were at risk infants (e.g., low birth weight or birth asphyxia but with no significant noted handicap) is in the area of reading disability and language difficulties (Davies & Tizard, 1975). These disabilities have appeared in samples of pre-school children in the form of stuttering, language development retardation and lack of spatial coordination. We have decided for this reason to monitor the psychological processes involved in reading and language abilities over the course of our study. During the first year of life, we will examine a number of behaviors related to later spatial-motor and language abilities. These measures include auditory-visual integration, visual attention and auditory habituation. We plan to follow these early measures with pre-school age measures; specifically, we shall give a version of the Birch and Lefford Auditory-Visual Examination.

This pre-school examination has been highly related to later reading skill (Hammill & Larsen, 1974).

In a similar vein, we will trace the development of cerebral specialization for language and speech during infancy. During the neonatal period, we examined postural asymmetry as an early indication of cerebral specialization. Later on, cerebral asymmetry via a dichotic listening technique is tested. Finally, we shall examine lateralization during the pre-school period with a number of specific neuro-motor tasks.

Previous research has indicated that the left hemisphere is superior at processing speech sounds and the right at processing non-speech sounds (Kimura, 1963). Dichotic listening techniques show that during stimulation from each ear, information is processed by the contralateral cerebral hemisphere. Recent infant research has found that newborns exhibit that pattern of cerebral asymmetry. Molfese et al. (1975), using auditory evoked responses to speech and nonspeech stimuli, and Glanville et al. (1977), using similar stimuli and heart rate response habituation, found that infants seem to display the adult pattern of asymmetry in neutral cortical response.

The development of lateralization to speech stimuli is being measured. Using a habituation paradigm and measuring heart rate, each infant receives 9 trials. On the first 7 trials, the habituation stimulus pair is presented once over each headphone, such that one ear receives one of the pair while the other ear receives the other. The 8th and 9th trials are test trials in which one ear will receive a novel test stimulus of the same stimulus type as the habituation pair. All stimuli will be presented at a level of 80 decibels; intertrial interval will be 15 seconds. Each infant receives two tests with change in either left or right ear. Speech stimuli which are synthesized 350 milliseconds stop consonants and vowel syllables are used. Speech stimulus sets A & B consist of ba/da as the dichotic habituation pair with a stimulus change to /ga in either the right or left ear on trial 8 and 9.

At the present time we have completed data analysis on three of our four groups: healthy term controls and healthy and sick preterm infants. Heart rate for each of the pre-stimulus and stimulus periods was computed and an analysis of covariance with Group (Healthy term/Healthy Preterm/Sick Preterm), Trial (1-6) and Ear (Left/Right) was computed. Results reveal a main effect for Group $F(2,32) = 3.46$, $p < .05$ and Trial $F(6,191) = 2.16$, $p < .05$, Orthogonal decomposition revealed a significant linear trials effect $F(1,31) = 4.87$, $p < .03$: quadratic trials $F(1,31) = 4.75$, $p < .03$. There was no difference in Ear and data as presented in Figure 6 are collapsed across Ear. The results indicate that all three groups show initial orienting to an auditory stimulus and across trials habituation of that response. The data also reveal a significant difference in base heart rate level and in heart rate across trials between sick preterm and the other two groups.

On trials 8 and 9 a novel auditory stimulus was presented to either the left or right ear. To assess HR response to the novel stimulus analysis of covariance with Group (HR/HP/SP), Trials (7/8/9) and Ear (left/right) was computed. Results reveal a significant effect for Diagnosis $F(2,31) = 3.53$, $p < .04$, Trial $F(2,63) = 4.15$, $p < .02$, and interaction of Diagnosis and Trial $F(6,143) = 2.96$, $p < .05$) but no main effect or interaction for Ear. As seen

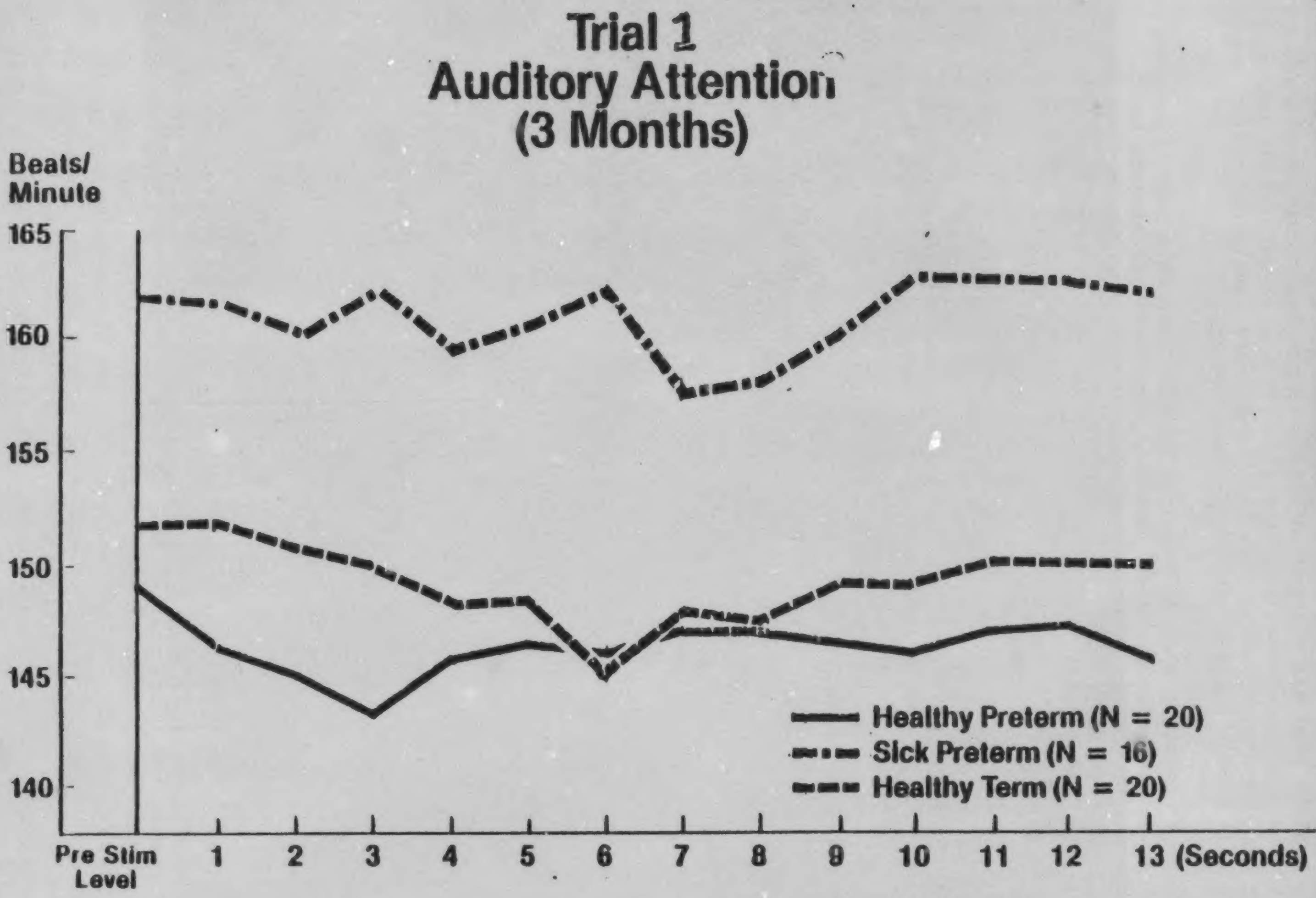


Figure 6. Trial 1 - Auditory attention (3 months)

in Figure 7, healthy term and preterm infants evidence heart rate deceleration (recovery) to the novel presentation while sick preterm do not. Also, again, sick preterm exhibit significantly high base heart rate levels and heart rate across trial than either healthy term or preterm infants.

These results indicate that by 3 months healthy preterm infants (preterms who have not undergone major perinatal medical complications) respond to repeated auditory stimuli in a manner similar to healthy age matched controls. In addition, healthy preterms seem to be able to discriminate a novel transformation across a phonemic boundary in consonant vowel sounds. Interestingly, neither healthy term or healthy preterm, both who evidenced recovery to change across category, exhibited an ear preference.

The results also highlight the effect of illness-specifically respiratory distress syndrome - on preterm infants response to auditory sounds. Sick preterms exhibited higher base heart rate levels, and while there was evidence of initial orienting, sick preterms did not exhibit HR recovery or discrimination of sounds across phonemic boundary. The significance of these findings are currently under investigation in our lab.

Neuro-Motor Development: Manual Asymmetries (24 Months). Recent evidence has found that differences in performance between the left and right hands on particular tasks are probably determined to a large extent by the post-natal maturation of hemispheric communications (Trevarthen, 1974; Yakolev & Lecours, 1967). Clinical observations on adult patients with localized hemispheric lesions (Caron, et al., 1971) and on children with nonspecific brain syndromes (MBD) (Reitan, 1971) focus on the conclusion that at least in right-handed individuals the left cerebral hemisphere has primary control over the sequential features of fine motor coordination.

While most of the evidence indicating that the left hemisphere is preferentially programmed to regulate sequential features of fine moter skills as pertaining to right handers (Wolff, 1977), there is evidence that there is a direct association for both left and right handers between hand preference and manual asymmetry on the preformance tasks requiring accurate spatial localization under visual control (Annett, 1970; Flowers, 1975). However, the left hemisphere appears to control the serial order of manual motor skills in both left and right handed individuals (Lomas & Kimura, 1976). While this adult evidence continues to accumulate, there are few, if any, studies of normal children and the development of manual asymmetries--nor are there studies relating developmental patterns to a clinical population.

Our research addresses the development of patterns of cerebral lateralization and the functional significance of such development to learning disorders in a clinical population. For that reason, we have attempted to design measures that would trace the development of hemispheric specialization. Postural asymmetry is measured in the neonatal period, dichotic listening tasks during the first year. Finally, neuro-motor tasks will measure the development of manual asymmetries in our clinical population during the second and third years. The first two tasks are described elsewhere. The 24 month tasks are described below.

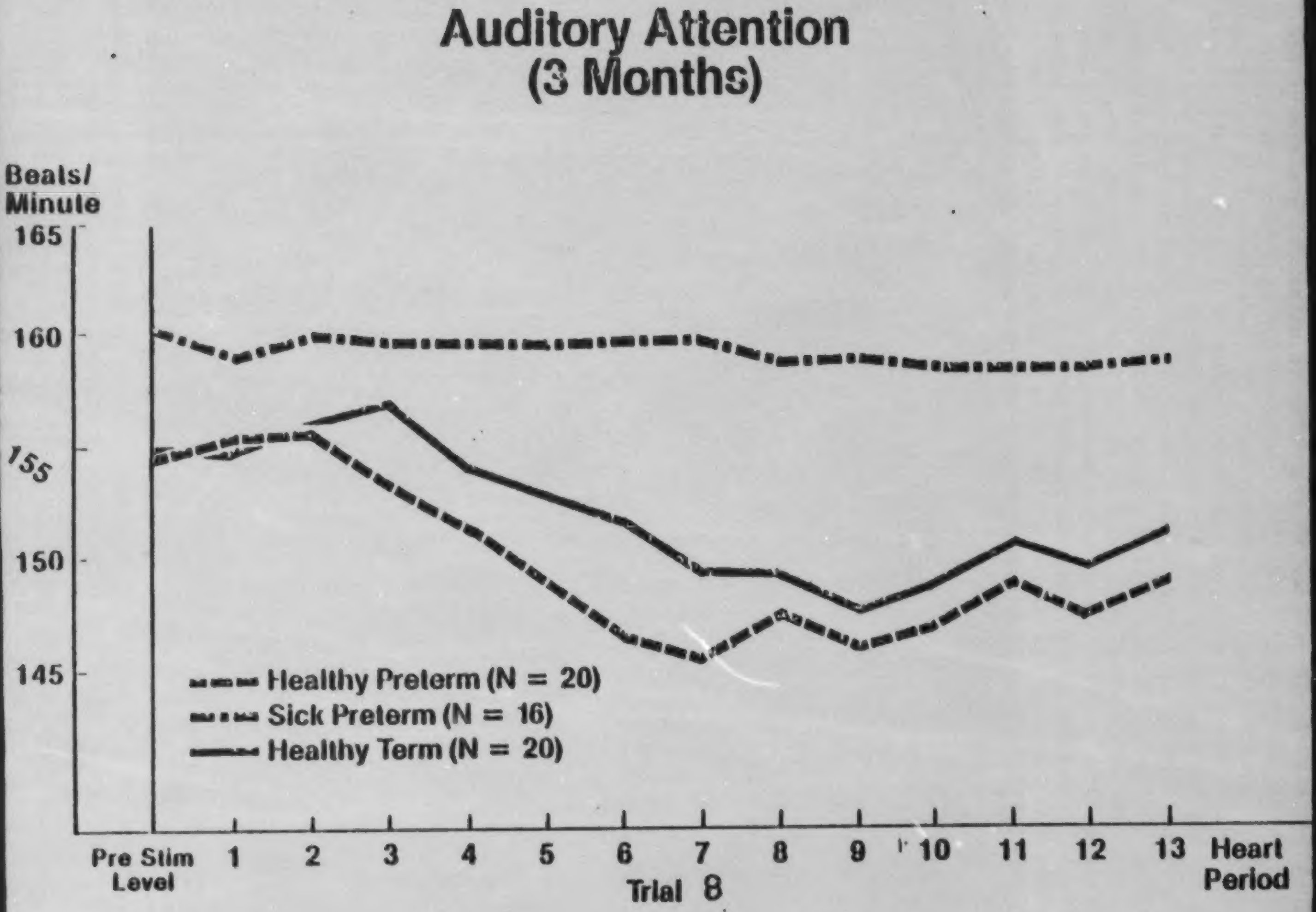


Figure 7. Auditory attention - Trial 8 (3 months)

The 24 measures of manual asymmetry take advantage of current work on the development of handedness (Ramsey, 1979, 1980a,b). This work has found that by 10-12 months of age infants show a definite unimanual preference and that during the second year of life they exhibit a definite hand preference in bimanual tasks. Interestingly, the development of handedness of both unimanual and bimanual usage seems to parallel the development of linguistic abilities. Unimanual handedness appears around the onset of repetitive babbling while bimanual coordination appears around the time of single word utterances. More recent research with learning disabled populations has found a greater number of left handed and ambi-dexterous children as well as children who are "clumsy" in the motor behavior. While the precise meaning of these relationships are unknown the link between mixed hemispheric dominance (left handed) and lateralized function for language has been implicated as a possible etiology for language and reading related disorders. To date there are no longitudinal studies which have accurate birth history information and have followed the ontogeny of handedness and coordination in a group of children. Our particular investigation will therefore be one of the first to accurately chart the relation between handedness, coordination and birth history.

Measures at 24 Months

Handedness is observed at 24 months by allowing the child to play with a xylophone and baton and then a hammer and shape sorter toy. Each toy requires the child to use one hand (to hit the xylophone with the baton or hit the sorter with the hammer). The child is handed the baton or hammer to either right or left hand in a counterbalanced design and the use of that hand or transfer to the opposite hand is noted.

Measures of bimanual coordination include allowing the child to play with a plastic nut and bolt and observing the child's ability to unscrew the nut from bolt and also to screw the nut onto the bolt. Again, presentation is in a counterbalanced design.

Medical Domain

A myriad of medical information is routinely collected on a newborn infant, particularly one who is sick or remains for some time in the Intensive Care Unit. The selection of specific medical data from this conglomerate will be of importance to us in the detection of handicaps among our at risk population. The process of selection is directly related to our conception of risk. It is unwise to classify all infants whose mothers had some unusual event occur during pregnancy, labor or delivery, or who as infants, suffered some neonatal problems, as at risk infants. A number of researchers have pointed out (Howard et al., 1976; Rogers, 1971) that complete categorization of high risk infants would entail sixty percent of all newborns. That is, using any of the criteria (obstretical or neonatal) alone, one would have to include most newborn babies in a category of risk. At the same time, however, the research literature (Parmelee & Haber, 1973) suggests that no single prenatal, perinatal, or neonatal risk factor has been successful in predicting outcome between different groups of infants. Clusters of risk factors have been more successful, although they have not been significantly predictive of individual differences. The probable reasons for these findings include that many pre-, peri-, and neonatal risk events result in transient rather than permanent brain damage.

And most importantly, the research literature, until now, has shown that environmental factors have a powerful influence on behavioral outcome--perhaps more so than early biological events (Sameroff & Chandler, 1975).

A final consideration in choosing our medical data is psychometric in nature. The charts and data collected by physicians, while thorough and complete, become unwieldly in detail. There are no ways of determining the weight specific items should have, nor would it be practical to choose all pertinent measures from medical forms because of the inappropriateness and noncomparability of scoring systems.

Medical Examination (Birth to Eight Months). We have decided to make use of a series of scoring systems already standardized and in use by the Parmelee Research Group at UCLA for medical information during the first nine months. This series--the Obstetrical Complications Scale, Postnatal Complications Scale, and Pediatric Complications Scale--contains summary items which are broad lists of categories which can be scored for each individual as optimal or not. Each one of the scales is self-weighted, based on the assumption that if a non-optimal event is particularly hazardous, a chain of association events will occur. For example, the loss of a point because the mother is above or below the specified age or because of a bleeding episode during pregnancy will be of no consequence if no other events occur. On the other hand, a mother above optimal age with hypertension might have bleeding due to abruptio placenta which necessitates an emergency Caesarian and her infant might have an Apgar score of five. This chain of events would result in the loss of a number of points and a deviant, non-optimal score. These scales together are designed to determine the degree of risk that an infant may experience. We have collected these data during the neonatal period and at each subsequent testing date through the infant's eighth month. These scales take into account three important observations. First, many pre- and perinatal insults result in transitory deficit; second, some insults are not obvious during early infancy and only appear at a later time; and, finally, there are some environments which provide optimal interaction and facilitate development, thus compensating for mild biological insult.

Each of the medical forms is completed by the doctors in charge of the infant's medical care. An infant's cumulative score is computed from the weightings of each item on the scale.

Medical Examination (One to Two Years). Infants have access to free well-baby care at the Roosevelt Hospital. The medical examination is administered by members of the Pediatric staff of the Hospital under the direction of Louis Z. Cooper, M.D. The neonatalogist will be directly responsible for the medical follow-up. Dr. Fisher has, herself, set up a medical follow-up clinic for at risk newborns, seeing them at specific age intervals over the first three years. The examination routine, developed by Dr. Fisher, will be administered to each of the infants in the prospective study.

Dubowitz Examination (Neonatal Period). Since we have chosen to examine a population of low birth weight infants, it is important at the onset that we determine if indeed these infants are premature and low weight or are small-for-dates, by estimating the infant's gestational age.

The idea that low birth weight babies are not a homogenous group is relatively recent. Gruenwald (1964) originally worked on the problem of fetal malnutrition and subsequently related it to retarded intrauterine growth. Lubchencko et al. (1963) at the same time published standards of intrauterine growth relating birth weight to gestational age. Both noted the need for weight by gestational age classification. AGA low birth weight infants, they found, were quite different from SGA infants and each group presented distinct medical problems.

The etiology of SGA, while not totally clear, involves four factors; 1) malnutrition, 2) infection, 3) congenital abnormalities, and 4) multiple births. Winick's work (1968) found nutritional inadequacy as a prime cause of growth retardation. Other studies have also found a relation between poor prenatal nutrition and SGA. Two major infections, Rubella and Overt Cytomegalic Inclusion disease, also affect birth weight. In addition, toxemia has a similar effect in retarding fetal growth. Smoking, alcohol and drugs have been proven to act as direct causes of retarded intrauterine growth. Finally, infants of multiple births are small for dates presumably because the placenta is inadequate to meet the needs of more than one fetus.

As seen in Table 9, the clinical problems of SGA and AGA low birth weight babies are quite different. For example, neonatal asphyxia tends to be more accentuated in SGA infants (Klaus & Faranoff, 1972). This is especially true in markedly undernourished patients. In contrast, the AGA premature infant's major pulmonary problem is hyaline membrane disease. Thus, the clinical signs physicians must be aware of and the progress of each infant is quite different. Importantly, not only are the clinical signs distinct as well as is medical diagnosis, but the potential handicapping conditions are very different. Certain types of complications, for example, hyperbilurbenia, are found in SGA infants result in mental retardation, whereas other medical problems found in AGA premature infants are etiological of spastic diplegia.

TABLE 9

A COMPARISON OF PROBLEMS IN SMALL-FOR-GESTATIONAL-AGE AND IMMATURE INFANTS

	SMALL-FOR-GESTATIONAL-AGE	IMMATURE
Gestation	28-44 weeks	37 weeks
Birth weight of siblings	Low	Normal
Pulmonary	Aspiration syndrome Pneumothorax Pulmonary hemorrhage	Hyaline membrane disease
Infection (congenital)	++	+
Hyperbilirubinemia	+	++++
Hypoglycemia	+++	+
Congenital Malformation	+++	±
Intracranial Hemorrhage	++	+
Apnea	+	+++
Blood	Polycythemia	Normal
Feeding	Large gastric capacity	Small capacity
Future retarded Growth	++	0

Note. From "Care of the High Risk Neonate" by M. Klaus and A. Faranoff (Eds.). Philadelphia, PA.: Saunders, 1977.

It is obvious, therefore, that there is need for accurate assessment of gestational age. There have been a number of different systems over the past years using an external physical characterization (Farr et al., 1966) or neurological examination (Amiel-Tison, 1968). Dubowitz et al. (1970) devised a scoring system combining neurologic findings and physical characteristics. The score obtained from assessment of each of 10 neurologic signs are summed and added to the scores of each of 11 external signs. Such a method is accurate to within two weeks. Badian (1977) has produced an abbreviated version of the Dubowitz in which only those neurologic criteria which do not require an alert and vigorous infant are used. This system has now been standardized and it is possible to use such a system to examine infants who are sick - a case when the neurological examination is impractical. Research has found the correlation of external characteristics alone to GA to be significant enough (.875) to allow their use. Farr et al. (1966) analyzed the 11 external characteristics and examined the relationship to external and neurological characteristics. They found only one of the neurological and four of the external characteristics significantly predictive of gestational age and found that use of only four external signs gave an estimate of gestational age to within 15 days.

Many studies of low birth weight babies use only maternal history to estimate gestational age. However, the data on last menstrual cycle is often non-exact and it is for that reason we have chosen to use the Dubowitz system. If an infant is ill and the Dubowitz is inapplicable, Badian's modification is used.

The Behavioral Domains: Perceptual-Cognitive and Socioemotional

Unlike the medical and neurological domains, the following two areas, perceptual-cognitive and socio-emotional, are based upon current developmental research and our theoretical understanding of the human infant's behavior. Both domains include measures which have not been specifically administered to at risk populations but which have a long research history in the developmental literature. Our goal is to investigate competencies of the infant that relate to its information processing abilities and view the baby as an active, competent and complex organism, interacting in a social world.

One of the basic principles underlying the research of the Institute is that the infant is an active, competent information processing organism. In addition, this active, competent, cognitive organism is constantly interacting and developing in his environment as he is changing the world in which he interacts. For these reasons, then, it is necessary to investigate the varied capabilities that the developing organism has at its' disposal as well as how these capacities change in interaction with the environment.

Perceptual-Cognitive Domain

Until recently, measurement of mental functioning in infant or preschool samples of children who were at risk involved only psychometric testing. The large-scale prospective studies of high risk infants usually administered Gesell or Bayley examinations during infancy and a number of years later (usually with no intervening testing) would measure IQ with Stanford-Binet examinations (see the review of at risk infants for a detailed discussion of the results of this research). Current projects, such as that of the Parmelee group at UCLA, have taken cognizance of the fact that infant psychometric tests have little predictive validity for later mental development (see the review on early prediction of IQ). And, the new research has also been mindful of current studies in infancy which reveal that the neonate is a complex information processing organism, certainly more responsive to the environment then the brain-stem behavior creature medicine and psychology thought of in the past.

The measures we have chosen cover the processing of attention not only in two major modalities, auditory and visual, but also in their integration over time. As can be seen in Table 5, during the neonatal period we will measure auditory habituation. Later, at the three month session, both visual attention and sensory integration will be examined.

Also considered is the development of memory. Interest in infant memory has blossomed over the last number of years as studies in infant learning have decreased (Haith & Campos, 1977). While some have argued that memory has been implied through demonstration of a number of more traditional processes, e.g., learning and imitation, this research has contributed little to an understanding of memory development. The work of Fagan (1975), however, has clearly demonstrated the effect of long term recognition memory for patterns and pictures of faces. Collectively, these studies reveal striking storage capacities in young infants and the operation of such factors as interference and consolidation as interacting with storage. More recent work (Cohen & Gelber, 1975) has solidified the area of memory development into a pursuit for the interaction of motor behavior, attention and cognitive capacity. Thus, it seems appropriate that we examine the onset and course of such cognitive behavior-particularly as it refers to clinical populations whose experience with the environment may not have been a facilitative one.

We shall also examine language competencies. A great deal of research has been done on language development, since with the onset of language, the young child can more effectively interact with and make himself understood by other individuals. Language is considered perhaps the most important developmental milestone as early language skills are the first good predictor of later intelligence, formal schooling (at least of normal children) is predicated on language knowledge, and general intelligence in adults is in large part linguistic (for example, the verbal part of the WAIS is considered a good approximation of the IQ score).

In the first three years of life, language development has traditionally been studied in terms of phonology, syntax, and semantics (for reviews of this literature see Brown, 1968, 1973; Cazden, 1972; McNeill, 1970). Under phonology the development of appropriate speech sounds for each language (McNeill, 1970), the relation of speech and nonspeech sounds (Bever, 1970), and the relationship of early babbling to later speech (Irwin, 1947; McCarthy, 1954) are all studied. Under syntax, investigators try to describe the child's corpus of language and to understand the orderly acquisition of different levels of grammar (e.g., Braine, 1963; Brown, 1968; Cazden, 1972; McNeill, 1970). Production rather than comprehension in a small sample of children is usually scrutinized. However, the production is thought to be indicative of underlying language universals. Under semantics, the relationship of meaning and structure are investigated. Bloom's (1973) seminal work on her own child is a case in point.

Recently, we have presented a new approach to language development (Lewis & Cherry, 1977; Lewis & Freedle, 1973) which views language as a communication network. From birth onward, a communication network exists between the infant and mother, a social-cognitive network that gives rise to the development of language. Thus, language is seen as developing within a social context. This view has led us to examine early mother-infant interaction as a precursor to later language skills and to view the situation in which language occurs as central to meaning. The approach allows for earlier and more complex language studies. We will assess language competence in its expressive and receptive areas when children are 18 and 24 months of age.

In sum, the perceptual-cognitive domain covers the major areas of information processing ability and function. It goes beyond previous prospective studies of high risk infants in assessing the skills in a detailed manner and not through psychometric analysis. And, it allows the expression of environmental effect to emerge across age in the measures at hand. In the neonatal period the auditory habituation measure will be administered. At the 3 month visit, both visual attention and sensory integration tasks will be given, at 8 months a measure of sensory integration, and at 12 months, visual attention. At 24 months language tasks will be added as well as measures of concept formation.

Auditory Habituation (Neonatal Period). Assessing the intial cognitive competence of the at risk infant is a difficult task in terms of design and choice of dependent measures. Many studies have observed the effects of compensatory sensory stimulation on later sensory receptivity (cf. Cornell & Gottfried, 1976). These studies focus on group mean differences thereby obscuring the real point of investigation--individual differences among at risk children. Few studies focus on individual differences within a group of high risk babies.

Since we believe that response decrement to a redundant signal may be related to cortical functioning (Lewis, 1971), we feel it imperative to examine the possibility of and patterns of sensory habituation in the at risk infant. Sokolov (1963) had originally proposed that repetition of a signal organized a neuronal model of that signal. The psychological analog of such a model is the schema or memory trace. Lewis and others (Lewis et al., 1969) have, in addition, found that the degree of response decrement (or ability to build a memory trace) is related to the conceptual age of an infant and shows the least change in response to repeated stimulation. The older the child gets, the faster the rate of decrement, thus allowing the hypothesis that, with age, the infant's information processing capability increases. In addition, Lewis has proposed that the rate of response decrement and recovery may be measures of individual differences within different groups of children. In a paper with Yoshida (Yoshida et al., 1974), Lewis found that response decrement to an auditory stimulus as measured by heart rate change differentiated between at risk infants with low Apgar scores and control, normal Apgar score subjects. Berkson, et al. (1974) found that very young prematures reliably respond to high intensity auditory stimuli with cardiac acceleration. Segall (1972) also found good cardiac responsivity to auditory stimulation. Heart rate change to auditory stimuli may, therefore, be an adequate and responsive measure of the young infant's information processing capability.

Test sessions are conducted during the half hour before the regularly scheduled afternoon feeding time. At the start of each session, the experimenter (E) brings the infant into the testing room. The infant is awakened, placed at the midline of an isolette, and is allowed a few minutes to adjust to the surroundings. The E sits to the side of the subject and touches him only in cases of crying or obvious discomfort. The auditory stimuli are presented through a small speaker placed on a ledge of the isolette at the foot of the infant. Each newborn is exposed to two different sets of auditory stimuli. Set one includes: 6 20-second presentations of a female human voice reciting a paragraph (65 decibels) followed by 2 20-second presentations of a male voice reading the same rhyme at the approximate decibel level as the former stimuli. Each stimulus period is followed by a 20 second inter-trial interval. Set two includes: 6 20-second presentations of a pure tone tone sine wave (65 db) followed by 2 20-second presentations of a sawtooth wave at the same db level.

We measure cardiac responsivity and habituation to the auditory stimuli during the experiment. We expect that the magnitude of deceleration to an initial auditory stimulus will reflect intial orienting and attending and that the magnitude of change will decrease as the auditory stimulus pattern is repeated.

The results of this experiment will be presented at the meetings of the Society for Research in Child Development in Boston, April, 1981. Preliminary analysis reveals that term infants demonstrated a biphasic response (acceleration then deceleration) to stimulus trials 1 and 2 and monophasic deceleration to trials 3-5. By trial 6, no change in HR response was evident, indicating, perhaps, that across redundant trials term infants had habituated to the auditory stimulus. On trial 7, (DH_1) term infants exhibited a biphasic response while on trial 8, (DH_2) the primary response was deceleration. A comparison of trials 6 and 8 revealed a significant trial effect ($p < .029$) indicating that dishabituation had occurred by the second presentation of the novel stimulus. As a second indicator of habituation/dishabituation term infants responded with a decelerating response on Trial 9.

Preterm subjects demonstrated a biphasic HR response to trial 1 and sustained HR deceleration on trials 2-6. There was no trial effect and inspection of the mean HR change data reveal equal magnitude of change on trials 2 and 6. On trials 7 and 8, the novel stimulus trials, no significant HR response was demonstrated. However, on trial 9, preterm infants exhibited a biphasic response.

These data reveal that preterm infants as young as 35 weeks conceptional age can show a HR orienting response to specific auditory stimuli. Unlike term infants, preterm infants continue to respond with HR deceleration across redundant trials. Also unlike term infants, preterm infants can exhibit orienting as young as 35 weeks they may not be capable of processing the redundancy in information nor in discriminating the familiar to novel change. By 40 weeks (term) infants seem to be able to both orient, habituate, and discriminate differences in auditory stimulus presentation. These data illustrate the possible different mechanisms involved in HR orientating and habituation and the possible relationship of the onset of these capacities with biological age (see figures 8 and 9).

Sensory Integration (Three and Eight Months). The at risk infant's initial environment is the isolette in the Intensive Care Unit. Rather than being a stimulus deprived environment or even a monotonic stimulus environment as some have thought (Powell, 1974), the premature infant hears loud noises, sees flashing lights, and is handled by doctors and nurses daily. The probable difference in visual, auditory and tactile stimulation between a normal term infant's experience and an at risk infant may not be in the quantity of stimulation, but in its organization of pattern. When a normal newborn feels a change in temperature, it is usually accompanied by a change in light intensity (the sun shining on it) or movement (held next to mother). An infant in the isolette may experience that same change in temperature but no concommital changes in other modalities. Thus, we might expect disorganization in stimulus organization rather than sensory deprivation to be a major problem of the young premature. For that reason, we feel it important to investigate the ability of those infants who have had ICU experience at sensory integration.

The relationship of auditory-visual integration of language and later reading skills has been well documented (Birch & Lefford, 1963). While this relationship is complex (Reilly, 1973) it is clear that the inability to organize visual-auditory stimuli relates to poor reading skill. Badian (1977) found that retarded readers have difficulty processing temporal stimuli, a deficit he relates to audio-visual integration. Holloway (1971) comparing delayed and normal child readers found audio-visual integration to be directly related to reading skill. Finally, in a provocative report, Cohen and Hanson (1975) found that stutterers performed less well than fluent speakers in visual-auditory integration tasks supporting the theory that the cortical organization of stutterers may be different from and less efficient than that of fluent speakers. Stutterers seem to possess some type of specific neurological dysfunction which prevents or interferes with their ability to perform effectively on receptive functions such as intersensory integration. Most importantly, a majority of the stutterers in the cited study and in the literature in general have come from premature or at risk categories.

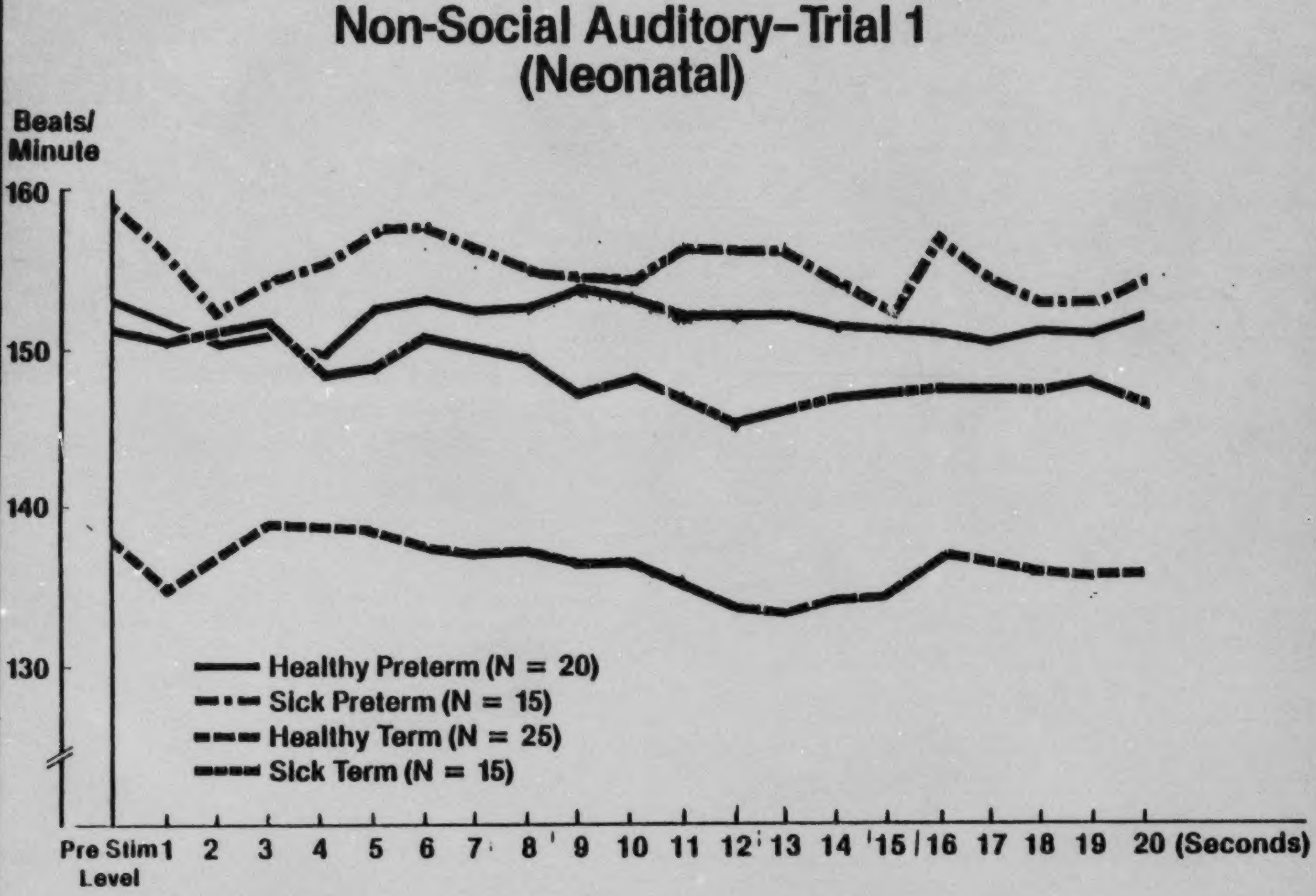


Figure 8. Non-social auditory - Trial 1 (neonatal)

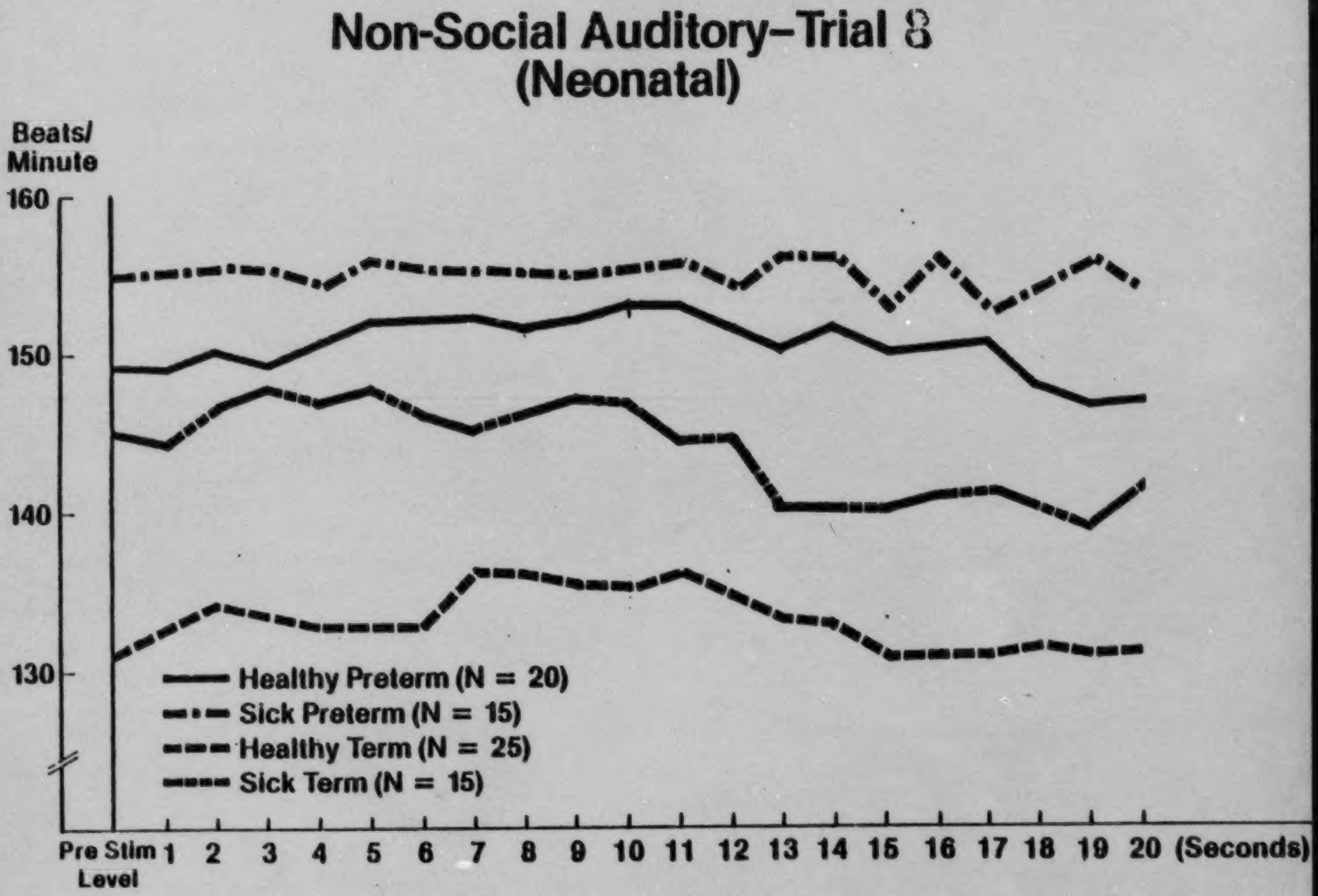


Figure 9. Non-social auditory - trial 8 (neonatal)

The research literature, therefore, highlights a definite association between past history of at risk conditions and later reading disabilities or language delay. This relationship between language delay, reading disability and high risk condition may be the result of inadequate visual-auditory integration as experienced by the at risk infant and its later consequences. Therefore, it seems important to assess the competence at sensory integration of low birth weight infants.

The research on sensory integration - or inter-modal knowledge - has concentrated on the infant's ability to identify the identity of an object through more than one property. Thus, infants have been confronted with stimulation to two perceptual systems, rearranged so as to give discrepant information about an event. In some cases the mother's face and voice were used as stimulus objects (with voice sometimes being displaced). Alternatively, an object has been paired with sound and then sound has been displaced, or an unfamiliar object has replaced the original stimulus. Across these studies, conflict behavior (Spelke & Owaley, 1979) or visual exploration (McGurk & Lewis, 1974) have been used as dependent measures of infant perception of inter-modal identity. However, these studies may not be asking the proper question about sensory integration that is important for the at risk infant.

Sensory integration, it seems, should specify the act of perceiving either the discrepant or non-discrepant nature of visual and auditory stimuli when these stimuli necessarily are linked in meaning. The studies of inter-modal integration have not teased out differences in these two conditions (e.g., perception of non-discrepancy when it should be discrepant and perception of similarity when discrepancy exists). Our aim is to differentiate these conditions as we investigate the high risk infant's attempts to match discrepant auditory and non-discrepant visual stimuli.

Infants are seated in an infant chair on a table facing a video monitor. After an initial baseline period an infant views 4 conditions of face and voice pairing. The conditions are: face and voice in synchrony and identity for spatial location; face and voice in synchrony but voice in discrepant spatial location; face and voice not in synchrony, but sound in proper spatial location; and face and voice not in synchrony and voice in discrepant spatial location. Each of these 4 sequences is preceded by 10 seconds of face and voice synchrony and proper spatial location of voice. Each of the test sequences lasts 20 seconds. Time between sequences is 20 seconds. Total time for the 4 sequences in 4 minutes.

Each infant receives all 4 conditions but the order varies across infants in accordance with a latin-square experimental design. Heart rate, visual fixation and head turning are monitored across all 4 trials.

In initial analysis of the data for the term, healthy group we have found that 3 month olds do indeed discriminate between conditions of asynchrony and spatial displacement when viewing a video tape of a human face and voice.

Different fixation and head turn patterns were shown for the four conditions, (see Table 10). When a face-voice event appeared normal, infants of this age attended to it; thus, there were few fixations and little head turning. When the face-voice was temporally asynchronous, the infants exhibited many fixations and few head turns as it attempted to deal with this violation. When the voice was spatially displaced the infant had two orientation tasks, to attend to the face and turn toward the voice; thus, there was a large number of head turns and fixations, as the infant integrated both face and voice into one percept. It would appear then that these two different forms of face-voice violation produced different responses from one another and from the normal face-voice schema. Finally, when the voice was displaced and asynchronous the infant both turned to the right (toward the speaker and voice) yet exhibited few fixations toward the screeen. This may be because the combined violation resulted in the infant's inability to perceive the auditory and visual features as a single event. Rather, they attend to each one separately as they would to two unrelated visual and auditory stimuli.

Visual Attention Task (3, 8, 12, and 24 Months). The nature of a child's attention to his environment may be an important window to his information processing capability. Specifically, the distribution of the infant's attention to a stimulus may provide a key to his cognitive structure. For example, the amount of time that an infant must attend to a stimulus before it remembers it or the number of trials an infant needs before it habituates to a stimulus seem to be measures of cognitive capacity. In addition, some research (Lewis et al., 1966) has found a positive relationship between attention to stimulus change and later preschool IQ. Lewis and associates (Lewis, 1975) have also investigated the relation of attention to stimuli among a group of at risk infants. Differences in attending between low and high Apgar groups of infants were found, thus indicating the ability of the visual attention procedure to highlight differences in information processing ability.

The experimental procedure for the standard visual attention task involves the presentation of a stimulus for N trials followed by presentation of a new stimulus at trial N + 1. Presentation of the original stimulus for N times should result in a decrement in the infant's attention over trials while presentation of the novel stimulus on trial N + 1 should result in response recovery. Both response decrement and recovery data may be related to the acquisition of internal representations, the greater rate of decrement recovery reflecting faster acquisition.

Lewis (1975) has presented a model for response decrement based on a two-phase process involving both alerting and attending behavior. The initial phase of attention to a stimulus invokes an orienting response. Sokolov (1963) originally defined an orienting response as one which would habituate (show a response decrement) to repeated stimulation. The second phase of attention involves the infant as actively building up an internal representation of the external event and utilizing that schema for subsequent presentations. Lewis believes that if response decrement is a measure of speed of model or schema

Table 10

Mean Data for all Subjects (N=15) across 4 conditions. Standard Deviations are in Parentheses.

	Condition			
	A	B	C	D
	Non Discrepant	Asynchrony	Spatial Displacement	Asynchrony & Displacement
Base				
Number of Visual Fixations	1.47(0.83)	1.73(1.53)	1.53(1.19)	1.27(0.88)
Number of Head Turns	0.07(0.26)	0.00(0.00)	0.00(0.00)	0.00(0.00)
Condition				
Number of Visual Fixations	1.33(1.05)	2.00(2.03)	2.33(1.92)	1.42(0.99)
Number of Head Turns	0.27(0.59)	0.00(0.00)	0.37(0.88)	0.73(1.10)

acquisition, the rate of decrement would be associated with efficiency of forming representation. In a number of laboratory studies, Lewis (1975) found that rate of response decrement was a function of age of testing. Three month old infants show relatively slow response decrement whereas older infants habituate at a faster rate. Lewis assumes that these age differences reflect a genuine measure of developmental cognitive processing. In fact, response decrement in infancy has also been related to Bayley scores at age 2 (Lewis & Brooks-Gunn, 1980).

Studies involving examination of brain injured children have confirmed the use of response decrement as a measure of CNS dysfunction and individual differences. Bronstein et al. (1958) reported differences in response decrement to repeated stimuli among a group of brain injured and control children. Further, Yoshida et al. (1974) found large individual differences among infants at risk. Thus, it seem reasonable to use a measure of visual attention as predictive of later cognitive functioning as well as early detection of pathology in visual information processing.

Three electrodes are first placed on the infant's body (one on the child's chest, one on the lower left of the adbomen, and one between the shoulder blades) with contact jelly between the electrodes and the body. The electrodes are held with adhesive tape. The electrodes are then connected to the polygraph for heart rate (HR) recording and a baseline reading is checked. The infant is then seated in an infant seat in front of a rear projection screen in the testing room. At 3 and 8 months, the social and non-social conditions described below are presented to the infant. These are counterbalanced across subjects. At twelve months, the embedded figure condition described is presented.

Nonsocial Visual Condition. 35 mm slides of geometric forms constitute the nonsocial visual stimuli. Trial and intertrial intervals are 20 seconds in length. Blank slides are used for the intertrial intervals. The series starts with a blank slide; a multi-color slide of straight lines is presented for the first six redundant trials. A multi-color slide of curved lines, a configuration of the redundant stimulus, is presented in the seventh novel trial.

Social Visual Condition. The presentation of social visual stimuli follows the same format as the non-social visual task. The redundant stimulus is a color drawing of a male and female adult, each holding the hands of a young female child. The novel stimulus is the same drawing in black and white.

Four issues have been explored in the visual attention studies at 3 months: first, do the different "at-risk" groups show habituation and recovery to repeated redundant and novel visual stimuli; second, are there differences in attention pattern dependent on the type of stimulus presented; third what are the effects of illness on attention; and fourth what are the effects of differential postnatal experience on visual attention. We have begun to piece together answers to each of these questions and present in the following figures data which, in part, may help understand the differential effects of prematurity and illness on visual attention at 3 months.

As seen in Figure 10,both healthy and sick term infants exhibit decreasing fixation to redundant visual presentation (Trials 1-6) and both groups exhibit recovery of attention to a novel stimulus (Trial 7). This effect is most dramatic for the non-social stimuli. As seen in Figure 11, a different pattern of attention is exhibited to the social slides. Healthy Term infants show a curvilinear response across redundant trials and no recovery to novel slide while sick terms show a steady linear pattern across all 7 slide presentations. Perhaps the social slide is more complex, containing more information. Hence it is more difficult to process for both term groups and particularly so for the sick group. Further work on the relation of stimulus differences to attention in different risk status infants is required.

Figure 12 presents the visual attention data for both social and non-social stimuli for healthy preterm infants. There are 2 groups in each part of the figure, representing age corrected prematures and post-natal preterms. Age corrected prematures were seen at 3 months conceptional age (3 months plus the length of their immaturity) while post-natal, uncorrected preterms were seen 3 months after they were born. As can be seen the type of stimulus significantly effects infant behavior in relation to maturational status. Specifically, there are no differences between corrected and uncorrected infants in regard the non-social stimuli (right side of figure) while there are significant differences between corrected and uncorrected infants in the social condition. Length of postnatal experience did not seem to enhance preterm performance on the non-social slides. It clearly enhanced performance on the social set. As mentioned earlier the social slide set differentiated the healthy and sick term infants while the non-social set of slides did not. With our healthy preterm group, the social set discriminated age corrected form the younger preterms while the non-social set did not. It seems therefore that the particular qualities of the social set, more complex set of stimuli both discriminate maturational qualities as well as medical status of the infant.

Embedded Figure Condition. At 12 months, infants are presented with a series of six identical slides which contain two geometrical shapes embedded within each other. On the seventh trial, a new slide representing either one of the two figures alone, a reversal of the embeddedness, or change in one of the two embedded shapes is presented. Slide presentations last for 20 seconds with an intertrial interval of 20 seconds. Visual fixation and vocalization are recorded.

24 Months Visual Attention

At 24 months infants are presented with the "social" slide stimuli. This set is identical to that presented at the 3 & 8 month testing session. Slides are presented for 20 seconds with a randomly varying inter-trial interval ranging from 15-25 seconds. The identical slide is presented to the infant until a criterion for habituation is met. This criterion is that visual attention to two consecutive trials must be for each of those trials

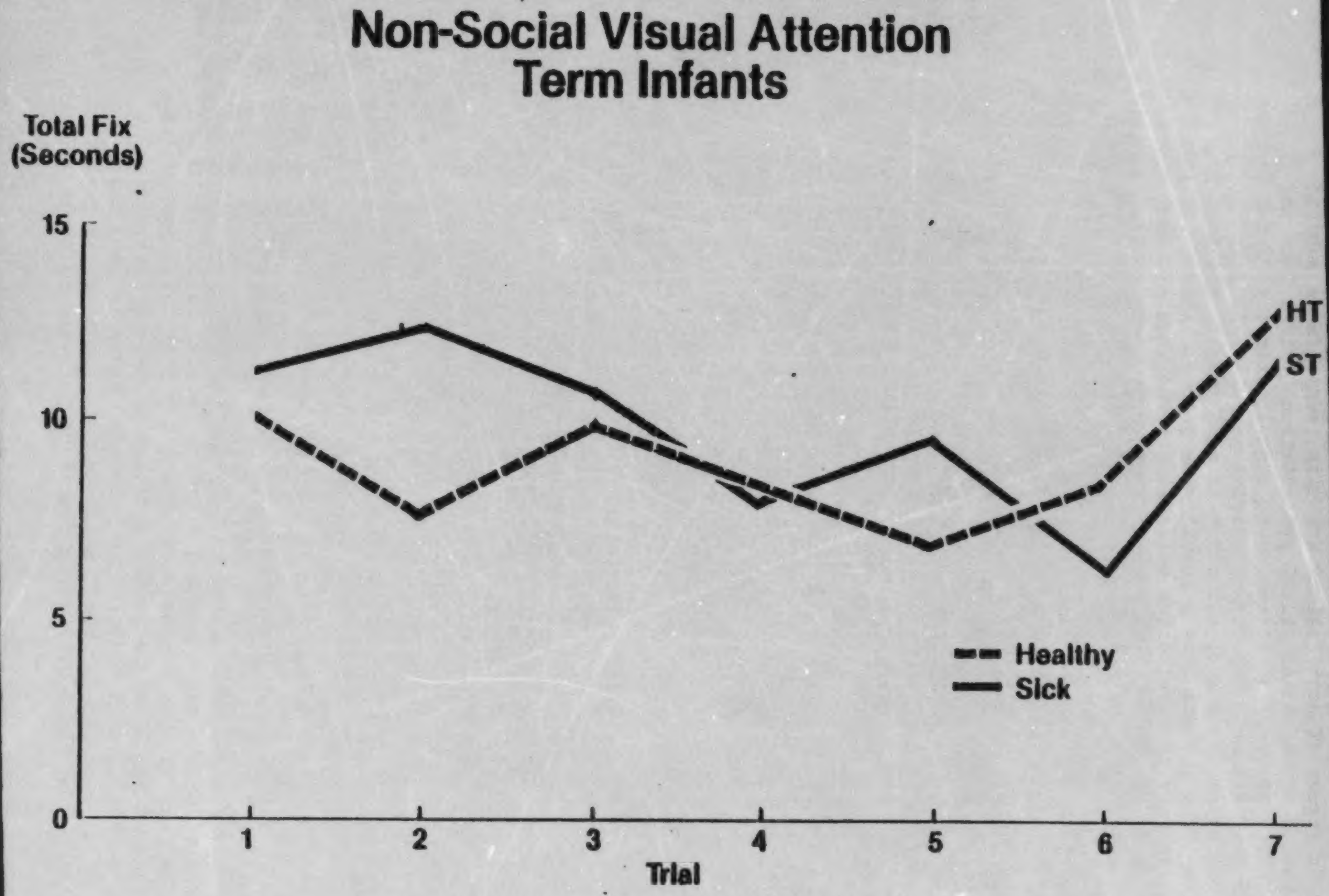


Figure 10. Non-social visual attention: Term infants

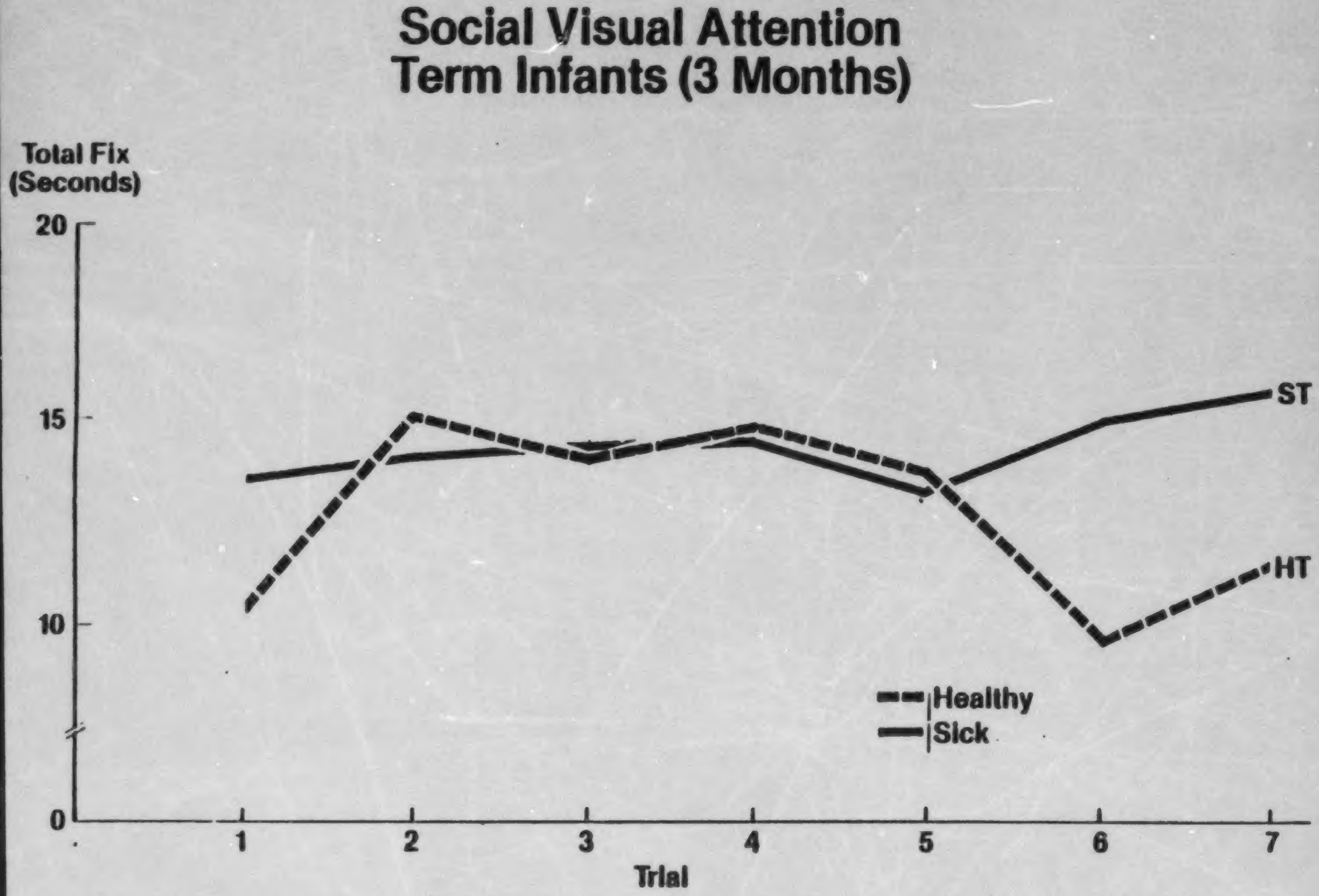


Figure 11. Social Visual attention: term infants (3 months)

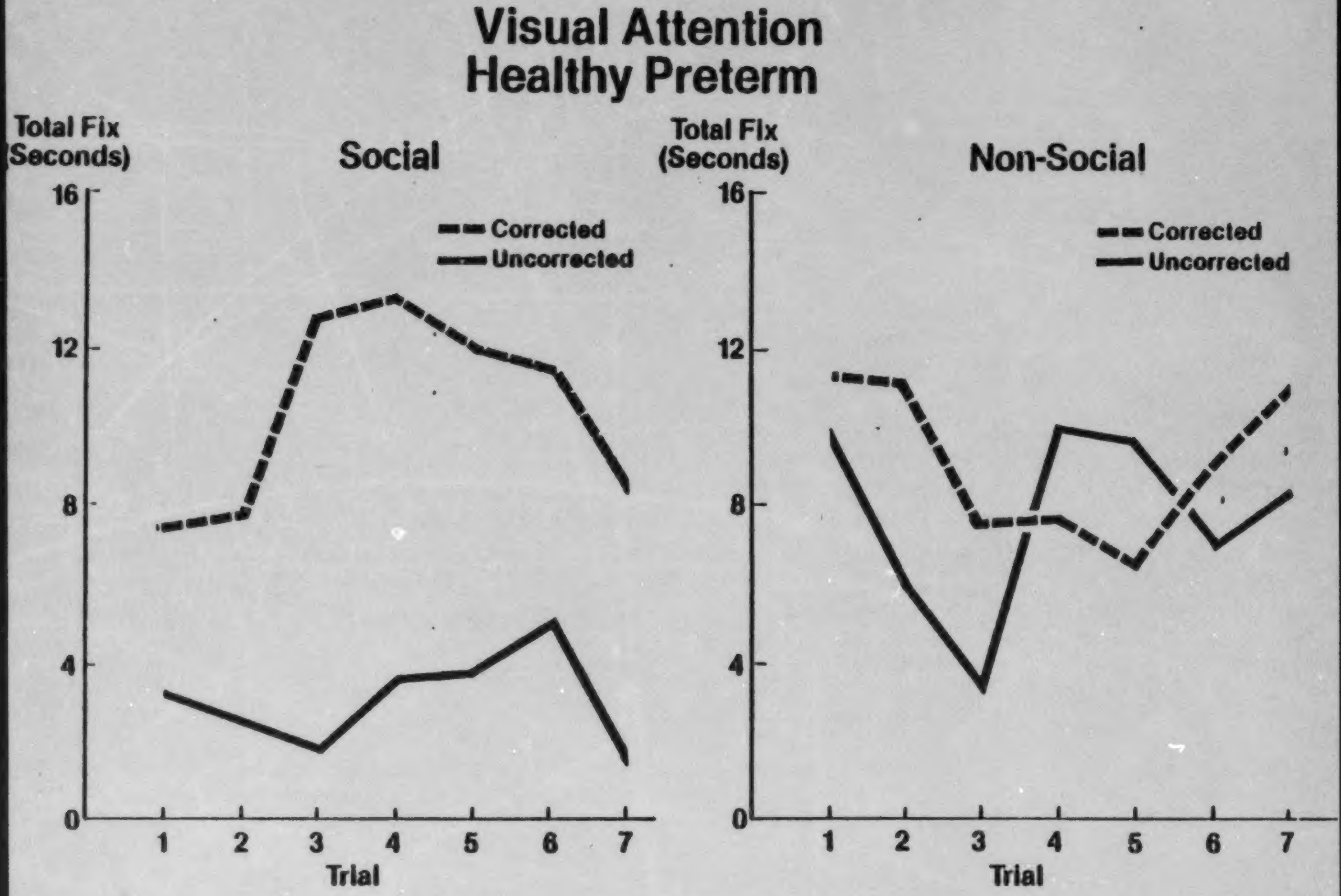


Figure 12. Visual attention: healthy preterm

less than 50% of the mean of visual attention (total fixation) to the first two stimulus presentations. When this criterion is met the subsequent slide, the novel transformation is presented once.

Procedures. The attention task is carried out in a specially designed room. Equipment for the task includes a polygraph, a cassette tape recorder, slide projector, slides of social and non-social stimuli and tapes of social, non-social and defensive response auditory stimuli. EKG is recorded on the polygraph. The polygraph record includes raw EKG (heart rate) measured in beats per minute. In addition, the cardiotachometer translates (performed internally by the polygraph) the length of the interval between the EKG spikes into a heartrate in beats per minute. Visual fixation is also recorded.

The scoring procedure for the attention tasks include both reading the polygraph record and the fixation records and deriving scores. Following is an explanation of how we read the polygraph records for the attention tasks. The stimulus period to be measured is divided into three equal parts, each seven seconds long. A two second base period immediately prior to the onset of the stimulus is measured and also divided into three equal sections.

The three lowest consecutive beats and the three highest consecutive beats in the period prior to the onset of the stimulus are recorded. Within each of the three stimulus periods, the three highest consecutive and the three lowest consecutive heartbeats are then recorded.

For the visual episode, the three beats immediately prior to the onset of the stimulus, the three highest consecutive and the three lowest consecutive heart beats that occur during a fixation are recorded. These nine heart beats are the only heart beats to be read for a given trial of the visual episode. During the stimulus period, only heartbeats which occur during a fixation are considered.

For each set, the Cardiac Δ Low, Cardiac Δ High and Cardiac High/Low are calculated for each trial as follows:

$$\text{Cardiac } \Delta \text{ Low} = \bar{X} \text{ Low} - \bar{X} \text{ Base}$$

$$\text{Cardiac } \Delta \text{ High} = \bar{X} \text{ High} - \bar{X} \text{ Base}$$

$$\text{Cardiac High/Low } \Delta = \bar{X} \text{ High} - \bar{X} \text{ Low}$$

Measures. We will be studying primarily three measures of attention: (1) total fixation, or the total amount of time the child spent looking at each stimulus over the 20 seconds of presentation; (2) first fixation, or the length of the first look before looking away on each trial, and (3) cardiac deceleration measured as a change in heart rate from a base level prior to stimulation to the heart rate as sampled during stimulation. In addition, the number of fixations or discrete looks will also be analyzed relative to the total fixation measure. Finally, where fixation measures are difficult to assess, e.g., for a child with weak eye muscles who is cross-eyed, or a child with minimal head control who may be using his peripheral vision during the attention task, frequency of eyes opened may be substituted for number of fixations.

In order to assess the child's habituation to redundant stimuli (trials 1 to 6) we will analyze the change in heart rate between trial 1 and 6. We will also generate a score for each child using the formula: trials $\frac{1-6}{1}$.

To assess response recovery, we will also look at two measures: a comparison of trial 6 to trial 7 for each child, and trials $\frac{6-7}{6}$ for both auditory and visual data.

Language: Expressive and Receptive (24 months). Language development continues to be a classical problem in psychology. While the linguists emphasized syntactic development (e.g., McNeill, 1966), others have considered semantic development as central to understanding language development (e.g., Brown, 1973). A general acceptance of the importance of cognitive prerequisites in relation to language learning and in social dimensions has also occurred (Lewis & Cherry, 1977; Sinclair-de-Zwart, 1969).

Among clinical populations, language development takes on a different meaning. The results of numerous studies of at risk infants as toddlers finds a preponderance of language retardation, and lack of communicative ability (Zarin-Ackerman et al., 1975). Not only do some children have problems communicating their own desires and feelings, but they are also unable to comprehend language directed towards them. Because language is so important both in its cognitive and social aspects and because it serves as a reference tool towards description of concepts and events of the world, it seems crucial that we measure the child's ability to comprehend language as well as produce it. Therefore, we shall employ two different measures of language proficiency, one designated to examine receptive language and one designed to investigate expressive language.

It is important to note that recent work with infants and children has found evidence for lateralization of brain function at birth, presumably denoting the dispensation towards language in human neonates. While the effects of cerebral lesion due to perinatal illness are unclear on such a disposition (arguments for and against plasticity of hemispheric dominance abound) we hope that our measurement of lateralization will enable us to link early indicators of brain asymmetry or problems associated with brain asymmetry to language disorders. Here again, we are attempting to link across age different measures from different domains to validate the predictive results of our study.

For the 24 month language assessment tasks, we have included four measures to tap both expressive and receptive language. The four include a measure of receptive vocabulary, expressive language, and mother-infant interaction.

Receptive Vocabulary Test. As a means of investigating receptive language, we will use a modified version of a task developed by Beckwith et al. (1976). The child will be seated on the mother's lap facing a wooden wall mounted on a table the height of the mother's chair. In the wall (92-cm wide x 76-cm high) will be set two rearview screens (25-cm squares) onto which 35-mm slides of real objects or events will be projected. Above each screen there will be a clown face which can be illuminated by the experimenter at will as reinforcement for a correct response. The experimerter will sit slightly behind the child and operate a hand-held remote control which will change the slides and light up the reinforcing stimulus. The child will be presented with two slides at once and asked to touch the screen which corresponds to a verbal label presented by the experimenter. A correct response will be rewarded by the illumination of the clown face above the corresponding screen. The slides to be used are in color. The slide and the verbal stimuli to be presented by the experimenter are described in the Appendix. The first 13 trials are to be used as an operant training procedure to shape the correct response pattern. The next 34 paired pictures will serve as the test stimuli. Pictures will be paired so that the test items and foils sometimes belong to the same functional category (for example, a slide of a foot paired with a slide of a hand) and sometimes belong to separate or different functional categories (for example, cracker-boat). Difficult items will be interspersed with easier items and correct choices randomly arranged between the right and left screens. Final order of administration will be invarient. Verbal descriptions will be presented in English or Spanish as per subjects' language.

Socioemotional Domain

The socioemotional domain may be divided into two components--one which comprises measures of social development and one which comprises measures of the environment. In the first, development of social competencies will be assessed, specifically affective responses, self-recognition, and the child's interactive responses to its mother. Second, we will utilize measures of the infant's environment, since most follow-up studies of at risk infants point to the importance of environment (see review chapter). None of the studies reviewed have examined variables affecting the environment with the exception of the most general descriptive indices such as the Hollingshead Scale of SES. Since we believe that one cannot predict later functioning in terms of a specific behavior without an understanding of the interactional component of that behavior with the environment, we will describe the infant's environment in a variety of ways.

First the way in which environmental factors influence perceptual cognitive competencies will be examined. That is, given particular perceptual abilities, what is their operating level in and as a result of a given environmental situation. Second, the social environment of the infant will be described vis-à-vis mother-infant interaction during a feeding session in the nursery, in a structured play situation in the laboratory, and finally in a teaching situation. In addition, we will also interview the mother. We hope with these measures to gain an adequate picture of the kind of interaction that takes place, the type of mothering involved, and the responsivity of the infant to such caretaking. We believe such interaction will allow us to better describe the child's environment--where he grows up and what the conditions are which interact with his cognitive competencies to make him the person he is.

Mother-Infant Feeding (Neonatal Period). A good deal of the research on parent-child relationships has focused on how parents influence the child, and how, as an infant, the child becomes attached to the parents. The issue of how parents become attached to their infants and how the infant contributes to the development of parenting has been sorely neglected.

Recently, many investigators have been concerned with measuring specific behaviors of parental attachment (Barnett et al., 1970; Klaus et al., 1972). Bowlby (1969) defined attachment as those behaviors which serve the goal of increasing or maintaining proximity between mother and infant. Only a few researchers (e.g., Kennel et al., 1973; Leifer et al., 1972) have defined maternal attachment and then in terms of attention to and contact with the infant. Amount of ventral contact was found to differentiate mothers of full-term and premature infants. The former group of mothers showed more contact and smiling to their infants than the group of mothers with premature infants. Thus, amount of ventral contact and eye contact are potential measures of parental attachment (Leifer et al., 1972).

A second group of studies has shown that sequencing of behaviors, particularly during a feeding session, may be related to the mother's ease with her infant (Brazelton et al., 1974; Richards, in press). Richards describes a pattern of mutual smiling and timing of sucking and pausing which interacted with periods of eye contact during breast feeding.

Thus a feeding session may be an important period during which the initial process of attachment and the beginnings of a mother-infant relationship exist. And the amounts of body and eye contact and type of interaction may, in fact, tell us something of the mother's relationship toward her newborn. However, it must be stressed that these data exist solely for normal newborns. The pattern of behavior for high risk infants may be entirely different. For that reason, we have set out to investigate interaction during an initial feeding session.

While the child is still in the nursery, we observe (naturalistically) a mother-infant interaction during feeding. Within each of these categories, a set of discrete infant or maternal behaviors are recorded (checked off) every 30 seconds during the course of the feeding. (See Appendix A, Section 5 for Definition of Behaviors)

Parental Visit Chart (Neonatal Period). Recent evidence (Minde et al., 1975) has related visits that the mother made to the Intensive Care Unit while her premature infant was there to later mother-infant interaction. In general, Minde found that a higher frequency of visiting and calling related to a more "positive" later interactive style.

Our basic research stance commits us to an investigation not only of infant characteristics, but also of maternal and environmental variables which may later interact with biological insult. Obviously, a mother's concern/anxiety over her young infant's condition will affect her interactional pattern as Minde et al. (1975) have shown. We ask parents to record their visits on a simple log posted next to each child's isolette or crib.

Mother-Infant Interaction (3, 12, and 24 Months). The study of mother-infant interaction is an important way in which we can examine the process of infant development and the interactive nature of biological development with the environment. Through the use of observation techniques, we can examine the socioemotional development of the infant by investigating the infant's primary affective relationship; we can also study the infant's cognitive development by scrutinizing the mother's role in building the infant's expectations that his actions affect his environment, or by examining the beginnings of language development. In addition to discovering new patterns of infant-maternal behavior, it is possible through study of mother-infant interaction to detect pathology which might be due to either the status of the infant or the condition of the mother or some interaction of both.

Basically, there are two functions for the mother-infant interaction measure. The first function is, as described above, to investigate the socio-emotional development of an infant. Thus, we are interested in the development of interaction between mother and child and the relation between cognitive maturity and social interaction. The second, independent function of the mother-infant interaction measure is as a description or index of the environment in which the child exists. That is, we see the mother-infant interaction as measuring the environment in which the infant develops and with which he must cope each day. These two functions are independent of each other and basic to our research design. In the socio-emotional domain, we have measures which examine an infant's social development: temperment, affective response and self-recognition are three such tools. Measures which clearly explicate the environment are observation of feeding, parental interviews, mother-infant interaction and maternal teaching style.

An important factor in mother-infant interaction is the nature of the child's bond to its mother (and vice versa). The importance of this bond has been stressed by many (Ainsworth, 1973) and the determinants of its etiology has been carefully traced (Ainsworth & Wittig, 1969). Essentially, concern for responsive, attentive mothers and for a homeostatic interaction between mother and child (cf. Brazelton et al., 1974) has been stressed by those advocating an attachment stance.

The typical paradigm for observing maternal attachment consists of observing the infant and mother in a free play separation and reunion structure. In a free play situation, the infant-mother play together and at a given signal, the mother leaves the room. Observation of the infant's response to separation and reunion as well as its behavior during free play constitute measures of infant attachment (Ainsworth & Wittig, 1969). In addition, there are those who examine the child's use of the mother as a secure base under play situation or stress with stranger to determine the nature of the attachment bond (Rheingold, 1969). However, in both situations, the underlying theoretical assumption is that certain infant behaviors (protest and separation) are the result of certain maternal behaviors (such as response to crying) or that certain infant responses (noncuddling) are in part responsible for maternal behavior (lack of holding). While such a model of human interaction gains some parsimony in explanation of dyadic relationships, it does not cover the more basic questions involving changing maternal and infant behaviors which, themselves, are based on previous interactional history. This transactional analysis (cf. Sameroff & Chandler, 1975) is the basis for our observations of mother-infant interaction. We believe that the mother's social responses are directly related to her infant's social responses and that both are related to the changing social environment in which they live. Our task is to measure such changing interaction across time in our clinical sample.

The observation scale we use at 3 months involves the coding of interactions between mother and infant in a 20-minute free play situation. (See Appendix A, Section 6) The scale was developed by Lewis and Lee-Painter (1974) and is designed to investigate the contingent verbal and behavioral interactions between mother and child. As Lewis and Goldberg (1969) pointed out in a generalized expectancy model of development, the mother initially may serve as a major source of reinforcement and, hence, generalized expectancy. She is both contingency producer (and creator of expectancy) and provides an environment which facilitates the infant's self reinforcement. This in turn may be one basis for mastery, competence, motivation and the like. Therefore, it is important to observe the kinds of environment a mother sets up for her child linked to her expectations of the child's ability.

The three month observation includes 13 infant behaviors and 13 maternal behavirs that are coded by a trained observer over the 20 minute session. The 13 infant behaviors are Eyes Closed, Vocalization, Extra Movement, Fret/Cry, Feed-Bottle, Feed-Spoon, Play-Object, Play-Person, Play-Self, Smile/Laugh, Burp/Sneeze/Cough, Looking at Mother, and Sucking-Nonfeed. The mother's behaviors include: Touch, Hold, Vocalization, Vocalization to other, Look, Smile/Laugh, Play w/S, Change Diaper/ Bathe, Feed, Rocks S, Reading/TV, Kiss, Give Toy/Pacifier. (Definitions of each behavior are included in Appendix A, Section 6).

The second Mother-Infant Interaction Scale we use at 12 and 24 months is an observational tool used to measure the amount and characteristics of the interaction between a child and his mother or primary caretaker. The Scale was developed at the ETS Infant Laboratory (Lewis & Lee-Painter, 1974) and has been one of the principal assessment tools used (in several different forms) in a current longitudinal study of mother-infant interaction and its relationship to sex, birth order and social class being conducted in the Infant Laboratory.

The basic format of the Scale is a structured observation of the mother-child dyad in three different situations. The first is a free play situation in which the mother and child are placed in a room with a chair, some magazines and a number of toys. The mother is told that we are interested in observing her child's play behavior and is encouraged to interact with her child in any way she wishes--to do what she would do in her own home. This free play situation lasts 15 minutes. At the end of the 15 minutes, cued by a pre-arranged signal, the mother leaves the room and the second situation--separation--begins. Separation lasts for a maximum of 3 minutes (shorter if the child becomes too upset) and then the mother returns to the playroom. Her re-entry into the room marks the beginning of the third situation--reunion--which lasts for 5 minutes. During the entire 23-minute session, a trained observer codes all the behaviors of both mother and child onto a premarked checklist. This checklist allows us to determine the occurrence of each behavior, the initiation of any interaction with the other member of the dyad, or the response to an initiation by the other member. The observer also notes which toys the child plays with and evaluates the mother's departure and reunion style. The entire scale then, allows for an examination of the attachment relationship between mother and child.

The 12 and 24 month sessions involve a play session during which the mother is present in the room. The toys the child will have at its disposal include blocks, a ball, busy box, a stuffed cat, dolls, toy guns, a mallet, pegboard, popcorn popper, puzzle box, quarts, a surprise box and xylophone.

The following child behaviors are coded during the toy play: hold-explore-share. Maternal behaviors are demonstrate, give toy, accept toy, remove toy, and manipulate toy. Other child behaviors to be coded during the session include vocalize, look, smile, touch, fret/cry, approval, help, gesture, priximity, toy/non-toy, move/door, lap, and hold/hug. The maternal behaviors include vocalize, look, smile, touch, kiss, hold, directions, read, proximity, toy/non-toy, and other.

Parent Interview (Neonatal Period, Three, Eight, Twelve to Twenty-four). In addition to investigation of the infant's psychological and neurological development via experimental measures of research, we examine the clinical nature of the parent-child interaction as another way of explicating the environment. Clearly, parental emotions, knowledge of their child's condition, experience with children, and expectations affect their caretaking attitude and response.

Since infants remain in the nursery for a period of time, it is possible to stretch out the initial interviews over a number of sessions. The interview areas in the neonatal period cover topics on doctor-patient communication and parental expectations for their child, as well as parents' knowledge of their child's condition, general knowledge of infant care/child development, and parent educational practices (see Appendix A, Section 7).

The literature on doctor-patient communication makes clear a number of issues which certainly must affect parental attitudes towards their "at risk" infant. In the first place, doctors are generally seen as authority figures whose information and opinion is seldom questioned. Further, research has shown that in those cases where the doctor is not supportive, a high anxiety situation is usually produced. In the case of handicapped or high risk infants, medical research has found that doctors cannot deal with the ethical and psychological issues confronting them. They often do not communicate directly with parents when they suspect brain insult and are found not to be supportive of parental concern. The research literature also finds that doctors are often less communicative with parents who are of low socioeconomic status. Since the population of our study will be entirely of low SES, the concern for adequate doctor-patient communication is underlined. Thus, it seems important to investigate the amount and type of information doctors give to parents of "at risk" babies.

In addition to the type of information doctors communicate to parents, we are interested in finding out what kinds of expectations parents had for their baby and how these expectations may have changed with the birth of their high risk infant. This area of information is crucial in any study of parental attitude toward handicapped infants and, thus, to our explication of the infant's environment. The literature contains some reference to parental reaction to the birth of a handicapped child. Solnit and Stark (1961) write of the need of the parents to mourn the death of the idealized version of a child they had expected before they (the parents) can go on to accept their handicapped child. Broussard and Hartner (1970) outlines a sequence of emotional reactions to the birth of a handicapped child - one which goes through a number of phases: depression, rejection, anger to acceptance of the infant. Interestingly enough, there is little work on parental reaction to the birth of a premature, low birth weight or "at risk" child. Some research has shown differences in caretaking attitude between mothers who had premature infants and were allowed to handle them and those who had prematures but did not handle them while they were in the nursery (Barnett, et al., 1970). The data of Kennel et al. (1973) highlight differences between mothers who could be near their high risk infants and those who were not. While increased involvement between mother and high risk infant during early days seems to increase parental interaction with the child, there are no clinical studies which document the mother's changing attitude and expectations. This research is crucial, particularly if we are to adopt a model of research based on an interaction of changing environmental and biological variables. The parent's perception of the course of development during the first months may be important towards detecting developmental lag and towards indicating parental involvement in child care. Therefore, it seems important that we document maternal attitude across the course of study. It seems obvious that parental anxiety for an "at risk" infant does not end once the child is released from the nursery to home. In fact, research with low birth weight infants finds that in elementary school teachers report these children to be overprotected by their families and more prone to psychosomatic disease (Bjerre & Hansen, 1976).

In conjunction with parental expectations, the mother's and father's knowledge of normal development would be crucial to forming those expectations for their new baby. For this reason, parental knowledge of normal development is assessed. This data will clarify parental expectations and consider parents as detectors. Parents are probably first to notice aberrant behavior and, with some as yet unknown model of ideal behavior in their minds, make comparisons and bring their ill child, if necessary, in for medical attention. Thus, across the study, we hope to utilize parental sensitivity to their infant's development as a measure of development.

Another focus is on parental educational practices. We are interested in determining the nature of parents' views on socialization, parental attitudes towards punishment and reward, towards the goals and ideals they have set out for their child, and interaction patterns. Finally, at each interview, information is gathered on any important life events that may have occurred in the previous time period, including information on any participation by the infant or mother in service organizations, day care, or other intervention programs (see Appendix, Section 7).

The schedule of interviewing across sessions examines patient-doctor communication, parental expectation - and disappointment with their infant, parental knowledge of child development, and parental educational practices. During the neonatal period, a number of interview sessions will take place. Issues of parental expectation, knowledge of child development, and doctor-patient communication are dicussed. At the three-month session, parents are interviewed to find out what they have noticed over the course of the last months, what has happened developmentally to their child, and how their expectations have changed. Finally, at each session we see if parents have noticed anything they would consider suspect in their infant's growth. Through these interviews, we hope to get a clinical handle on parental attitude, expectation, and awareness of the needs and strengths of their child.

Development of Affective Response (Eight and Twelve Months). While developmental research has focused on the onset of cognitive and motor milestones, little work has been done on the development of affect. What work there is in this area focuses on affective response within a cognitive framework. The onset of fear is a prime example. Hebb's model of fear was basically one that found an interface between physiological and cognitive processes. Later theorists enlarged on this topic by adding dimensions of stimulus specificity (discrepancy or strangeness) or the relation of fear to attachment and maternal proximity. Interestingly, some of the original work on emotional development was done by those involved in psychoanalytic theory, relating emotional reaction to object relations development.

Recently, however, research has taken a more critical look at the development of affect (Sroufe and Waters, 1977). It's ontogenesis is no longer regarded as independent of other aspects of development, nor as one related solely to cognitive maturation. Most importantly, some work (Lewis et al. 1972) has highlighted the interactive nature of emotional expression within early infancy. Thus, one particular affect (for example, fear) may not be constantly or consistently expressed by the organism, but may be in balance with expression of other affective states and with the situation.

The measures we will use at both the 8 and 12 month sessions are drawn from two areas of research on the development of affect. The first area, investigated by Lewis (Lewis, 1975; Lewis & Michalson, 1975) involves measurement of the infant interacting in a particular set of situations. Specifically, we shall observe infant affective response to stranger approach and electrode placement at the beginning of the lab session at the 8 and 12 month assessment visits. We will use a modified version of the Lewis and Michalson (1975) socioemotional scales to score affective response.

The second area involves development of laughter during the first year of life (Sroufe and Waters, 1977); Sroufe and Wunsch, 1972; Cicchetti and Sroufe, 1977). Laughter is seen as an important affective marker of interaction between infant and environment. Sroufe has argued that laughter may be seen as an organizing factor in relating cognitive to affective growth: laughter enhances interaction and is involved in the discharge of tension. In addition, the development of laughter has been shown to parallel certain cognitive growth (Sroufe & Wunsch, 1972) and to lag behind in a similar fashion to cognitive development in certain handicapped populations (Ciccheti and Sroufe, 1976).

The scale we will use is a modified version of the laughter scale used by Sroufe (Sroufe and Wunsch, 1972; Ciccheti and Sroufe, 1976). It involves the mother presenting to the infant different experiences: the categories of stimuli include: auditory; tactile; social; and visual. An observer in the room instructs the mother on each task while a coder scores the infants response. Responses are scored along an affective response dimension examining facial expression and vocalization.

Infant Characteristics

The measures in the infant characteristics domain address two areas of development. First they allow us to measure the early individual characteristics of each infant and thus gauge the degree to which individual "infant temperament" traits may interact with other variables. Second, they allow us to gain a composite picture of functioning and compare it to standard norms for other infant populations. To allow comparative, normative assessment, we administer the Brazelton Scales of Neonatal Development in the neonatal period, the Bayley Mental Development Test at 8, 12 and 24 months, and the Stanford-Binet at 3 years.

Infant Temperament (Neonatal Period, Three and Twelve Months). We have stressed in our research program the importance of mother-infant interaction in the development of the young infant. In addition, we have noted the infant's definite contribution to the interactional scheme (Bell, 1968). It is likely, then, that individual differences in infant behavior, which have been called the early correlates of personality, would affect any type of caretaking interaction. It is obvious that infants are different from one another at birth in their responsivity to stress and temperament (Thoman et al., 1971). These differences may push the child to develop in one particular direction or may elicit from the mother different reactions toward the infant.

Infant temperament thus becomes a crucial variable for study in a design which stresses not only developmental milestones or competencies, but also their interaction with caretaker and environment. The dimensions of temperament outlined clearly by pioneering work of Thomas, Chess, and Birch (1970) include three major domains: motor activity, irritability, and passivity. Some children are more active in the level of motor activity than others--one mother may be hard put to take care of such a vigorous infant. Another infant may exhibit a low level of motoric activity and cause worry in the parent who would enjoy active interchange with her baby. There are some infants who cry at the least provocation and are difficult to placate. Parents who must stay up at night with such a child may develop a different attitude than parents of a child who rarely cries and sleeps through the night. Finally, there are those children who seem to be able to cope with new situations while others find similar situations threatening.

Obviously, others will react to their infant's specific temperament. These dimensions take on special significance when the infant is considered high risk for handicap or has been low birth weight. Descriptions of infant temperament may be important in detecting early, subtle individual differences which may interact with parental expectation of a handicapped child. We have, therefore, decided to investigate infant temperament as a separate measure during the first year of life.

There are a number of ways in which we will measure temperament. During the infant's stay in the nursery--the neonatal period--we question nurses as to their initial impressions of the infant's rhythmic sleep cycles, threshholds or responsivity, intensity of response and general temperament.

Subsequently, during the infant's three and twelve month visits, we administer to each mother the Carey Scale of Infant Temperament. The format of the scale is a questionnaire which is filled out by the mother. The questionnaire consists of 70 statements, each having three choices for completion, which describe the child's specific behaviors in a variety of situations commonly occurring in the child's daily life, e.g., feeding, interaction with strangers, and bathing. The three choices for each item describe an integral response pattern, mild response pattern, or a variable pattern. From the 70 items, 76 ratings are obtained in 9 categories of temperament: reactivity-activity, rhythmicity, adaptability, approach, threshhold, intensity, mood, distractibility and persistence. From these 9 ratings, one of the four categorizations of a child's temperament is made: "difficult" baby, intermediate, and "easy" baby.

Brazelton Neonatal Behavioral Assessment Scale (Neonatal Period). The commonly used examinations for assessment at infancy—Apgar, neurologic or pediatric examination--are useful in detecting gross abnormalities. They are not, however, useful in detecting mild dysfunctions. One of the reasons for their failure is that most of these infant assessment measures operate on the premise that the infant is a brain-stem organism. The Brazelton Scale (1973) however, is oriented toward a more holistic and comprehensive approach to infant functioning. The Brazelton allows examination of the infant's organization of CNS responses—cortical function and control--and their interaction with infant states. Prechtl (1976) was first to stress the importance of states in newborns' examinations. He has developed a screening test based purely on infant state which he relates to later functioning. However, his examination is limited in scope in relying solely on state variables and it is an extremely complex and time consuming examination. The Brazelton examination includes many of the Prechtl characteristics. It has the benefits of easy administrability and its scope goes from characteristics of infant state to habituation response. The examination has a set of 26 behavioral items which assess the neonate's capacity to 1) organize state, 2) habituate to different stimuli, 3) attend to a process sample and complex environmental events, 4) control motor activity while attending to outside events, and 5) perform integrated motor acts.

The predictive validity of the scale is of some issue. Brazelton et al. (1974) claim a positive level of prediction to later functioning based on scale comparison to items on a standard neurological examination. Osofsky (1976) found a number of high correlations between infant behavior at feeding and Brazelton items particularly with regard to arousal. Horowitz (1977), on the other hand, found low prediction to the Brazelton toward later functioning except for the behavioral items relating to habituation. However, even if the items have not been shown to reveal adequate prediction, they will give us an overall clinical picture of infant functioning that may relate to some of the other cognitive and social measures we will examine.

Bayley Scales of Infant Development-Mental Scale. (Eight, Twelve, and Twenty-Four Months). At 8, 12, and 24 months of age, we administer the Bayley examination. The Bayley Mental Scale (1969) is the most widely used and rigorously constructed of the American Infant Intelligence Scales. The Mental Scale (MS) consists of 163 items appropriate for infants approximately 2 to 30 months of age. The competencies assessed on the MS include sensory-perceptual abilities, object constancy and memory, language comprehension and production, cognitive abilities associated with the development of abstract thinking, e.g., generalization and classification and social abilities associated with interaction and imitation (Bayley, 1969).

Kreitzberg and Lewis (1978) have recently found that factor scores of the Bayley are more interpretable in understanding the competencies and deficiencies of individual children. Essentially, upon factor analysis, they found three major factors: manipulative, social, and verbal. Children were found to do better on one factor versus another though these differences may not have been reflected in overall MDI scores. Thus, we intend to use this factor analysis.

The goals of the Identification Project are early identification of risk, detection of potential handicapping conditions, as well as prediction of future performance. The plan of the project is to administer as comprehensive a set of measures as possible that, across time, may be evaluated vis-a-vis future performance. The best outcome and evaluation measure for a study such as this is the validity of measures in detection and the reliability of prediction. Our hope is that our model of development, stressing not only the biological and cognitive aspects of performance, but also the importance of interaction with the environment, will give us the greatest return in terms of positive detection and prediction. This in turn should lead to more powerful and successful intervention strategies and toward betterment of the at risk infant's future life.

Accomplishments to Date

The accomplishments in year 4 of the Identification project may be divided into three broad areas: 1) continuation of the follow-up project and desing of new measures for ongoing assessment: 2) data analysis, presentation and submission for publication to Scientific Journals; and 3) Training of graduate, post-graduate and medical staff.

1. Continuation of Follow-up

There are over 150 subjects enrolled in the longitudinal study at the Infant Lab, Roosevelt Hospital. These subjects, divided into 4 groups (healthy term controls, healthy and sick preterm and sick term) are seen at 3,8,12, & 24 months for assessment. During Year 4 the first subjects recruited in Year 2 of the Institute were seen for their 24 month visit. Thus, the staff was collecting data on 3,8,12, & 24 months olds during Year 4. The average number of assessments varied between 8 to 12 per week. Each infant was evaluated by the Institute research staff and were examined by the Neonatalogist and in some cases by the Pediatric Neurologist.

At the onset of Year 4 pilot testing and planning took place for the 24 month measures. In particular, measures of language development expressive and receptive were sought, pilot tested until the measures currently in use - the Receptive Language Measure and the Reynell Assessment Scales were chosen. In addition, extensive pilot testing of measures which could determine neuromotor competence, handedness and bi-manual coordination was undertaken. From the pilot testing the current measures of handedness and bi-manual coordination were developed.

2. Data Analysis and Presentation

The following assessment measures have been analyzed for the different groups of infants in the longitudinal study, the results have been written up and papers have been submitted for scientific review: Neonatal auditory attention; Neonatal mother-infant interaction; Neonatal Postural asymmetry Neonatal Parent Visiting to the Neonatal Intensive Care Unit; Neonatal Neurological exam of the Preterm Infant; Three Month Auditory Attention; Three Month Visual Attention; Three Month Sensory Integration.

In addition to the above papers which are submitted by the end of Year 4, the following data sets have been coded and are currently under data analysis: Neonatal Brazelton Exam; Three Month Mother-Infant Interaction; Three Month Infant Temperament; Maternal Life Stress Scale.

Finally, one of the major data analytic accomplishments of Year 4 was the set up for linking psychophysiological data collection at the Roosevelt Infant Lab to the computer facilities at the Infant Lab at Educational Testing Service. Specifically, the project entailed taking FM tapes upon which HR and behavioral information had been recorded and playing them onto the Infant lab PDP-11/10 system at ETS. The raw data that was dumped onto a magnetic tape then had to be transformed into organized readable form for the IBM 360 system at ETS. Currently, this entire system is operative and data collected at the Infant Lab at NYC can now be submitted after a number of transformation steps to intensive statistical analysis at ETS.

Accomplishments to Date

During year 5 assessments of the 160 infants in the longitudinal study continued. Assessments were completed across the five target domains: neurological; perceptual-cognitive; medical; socio-emotional; and infant characteristics. The goal of year 5 assessment was to complete as much of the second year (24 month) testing as possible. Data analysis and write-up results for 3 and 8 month data took place during the fifth year as well. Three pre-doctoral students completed dissertations on data collected in the longitudinal study. Finally, a significant percentage of the toddlers seen at 24 months were found to exhibit severe language and cognitive delay. There was evidence, in addition, for fine motor disabilities among a small sub-sample of the population. A large portion of year 5 time was spent arranging for proper placement of these children into programs suitable for their disability.

2. Competency Assessment Project

The Competency Assessment Project was initially funded by BEH. Although data collection has now been completed, the project remains incorporated into the Institute. This has happened because the aims of the project are so closely related to the endeavors of the Institute. Integration of this project with the detection unit has resulted in a highly productive exchange of information and expertise between the CAP Study and the Identification Project as well as between the CAP study and other projects of the Institute.

The original CAP was designed as a collaborative effort of two institutions: the ETS Infant Laboratory, a research group with expertise in the psychological foundations of early development and in the assessment of infants, and the Special Education Center of the City University of New York, a program with expertise in special education and in curriculum development for handicapped children. The Infant Laboratory has been responsible for (1) the design of the Competency Assessment Profile, (2) field testing of this battery at infant stimulation programs in New York and New Jersey, (3) collection and analysis of the basic research data on handicapped infant development via the CAP Battery, and (4) communicating the nature and use of the CAP Battery to educators of handicapped infants. The CUNY staff developed intervention techniques based upon the skill profiles from the CAP Battery. The involvement of the CUNY staff in the Competency Assessment Project ended with the termination of the grant in July of 1979 and resulted in several intervention modules being developed and utlized in several infant programs in New York City.

Objectives

Briefly, the major objectives of the Competency Assessment Project were three: (1) to develop the Competency Assessment Profile—a battery of assessment tools which can be used to measure the skills of handicapped infants and young children across the cognitive, social, emotional, and communicative domains; (2) to collect a substantial body of new data about the functioning and development of infants with known handicaps; and (3) to develop strategies for using the skill-oriented assessment battery and the basic research information gathered as a basis for educational intervention with handicapped infants. More specifically, the Competency Assessment Project had seven goals:

1. to identify and modify, where necessary, procedures originally used for research on normal infant development which can be used as assessment instruments for handicapped infants;
2. to integrate these instruments with certain standard infant assesament procedures (also modified where necessary) into an assessment battery which measures the social, emotional, cognitive and linguistic functioning of handicapped infants;
3. to specify the behavioral skills of handicapped infants using this battery;
4. to relate the skills of handicapped infants to age and developmental function;

5. to relate the skills of handicapped infants to diagnostic category (i.e., Down's Syndrome, physically impaired, etc.);

6. to study the interrelationships of skills as a function of both age and diagnostic category;

7. to develop the Profile for individual infants, different age groups, and different categories of handicapped infants; and

8. to develop intervention techniques based upon assessment with the CAP which can be used in infant programs.

It must be noted that in its design and implementation, the CAP is unique. This is true for several reasons. First, unlike most traditional assessment instruments, the purpose of the CAP is concurrent, rather than predictive, assessment of a child's abilities. Second, the CAP does not focus on only one area of skill development (e.g., cognitive), but rather assesses the child's functioning across several skill areas: cognitive, social, emotional and communicative.

The CAP's emphasis on the child's current skill levels across several developmental domains is a surprisingly innovative approach to research and assessment with handicapped infants. A review of the literature on handicapped children reveals that to date, psychological and educational research has not focused on specific competencies as much as on diagnostic classifications. Few studies have examined the behavioral skills in a group of handicapped infants to see whether and in what ways these skills are related and whether or not these skills are related to current classification systems. The field of assessment, while somewhat less oriented toward diagnostic classification, has not paid sufficient attention to the different strengths and weaknesses an individual child exhibits. Traditional infant assessment tools such as the Bayley Scale of Infant Development, for example, include items which tap several skill areas but result in a single, general level-of-functioning score. Not only is it misleading to summarize all of the competencies of any child (whether handicapped or normal) in a single "developmental index," but this approach is also of little or no value for planning educational intervention for the disabled or delayed child. Interestingly, the current trend in the field of Special Education is the design of programs based upon specific individual strengths and weaknesses. It is unfortunate that assessment tools currently available to educators, especially those of the very young handicapped child, do not complement and feed into this individualized, skill-based approach to intervention. The goal of the Competency Assessment Project, therefore, is to develop a battery of assessment measures which gives a "profile" of the child's strengths and weaknesses in the cognitive, social, emotional and communicative realms and is thus useful for educational planning.

Third, this project is unique in its use of knowledge and instruments from basic research on normal infant development to design the CAP Battery. The CAP does include a traditional infant assessment measure — the Bayley Scale — as a standard or referent for the other instruments in the battery. The Bayley is also useful as a guideline for other testing since it gives a sense of a child's general level of functioning and may be compared to the other more specific measures. The other standardized assessment tool is the Carey Scale of Infant Temperament, modified to make it suitable for use with handicapped populations.

All of the other CAP measures are basic research instruments revised to a greater or lesser extent for use as assessment tools for handicapped infants. Two of the Uzgiris-Hunt Ordinal Scales of Development—the Scale of the Development of Visual Pursuit and the Permanence of Objects and the Scale of the Development of Means for Obtaining Desired Environment Events—for example, are included among the CAP's cognitive measures. These scales were originally designed to study the normal development of certain Piagetian concepts, but are useful means of assessing very specific and important cognitive skills. Careful analysis of an infant's performance on these scales not only pinpoints his level of understanding of a concept like object permanence but is a useful basis for the design of cognitive intervention strategies. The other basic research tools comprising the CAP are drawn from infant research done by the Infant Laboratory over the past decade. These include the Mother-Infant Interaction Scale, the Mirror Self-Recognition Task and a Parent Questionnaire which tap social development, the Socioemotional Development Scale which focuses on emotional responsivity and the Attention Task which measures certain important cognitive competencies. Each of these measures is discussed more fully in a subsequent part of the report. The Attention Task, however, provides a very striking example of the way in which basic research can be used for clinical assessment purposes. This task uses a child's eye movement and heart rate in response to slides and sounds to measure certain information processing capacities—attention to stimuli, recognition of redundancy and discrimination between redundant and novel stimuli. Research using the Attention Task (Lewis, 1969, 1971; Lewis & Brooks-Gunn, 1981).indicates that performance on this task is indicative of current cognitive integrity and is also predictive of future intellectual development. Furthermore, unlike most infant assessment measures, the Attention Task does not require gestures, object manipulation or other motor responses. For both of these reasons, it appears to be a very promising clinical assessment tool for severely handicapped children.

Methodology

Design. Since the project began, 144 infants ranging in age from 3 to 36 months have been tested using the CAP. Although some of these infants actually came to the Infant Laboratory for testing, most were involved in "field testing". In field testing the subjects were tested in the infant intervention program which they attended. These infants fall into four handicap groups: Down's syndrome, primary motor impairment, developmentally delayed and multiply handicapped. Thus, the design of the study is a three factorial one, with age, diagnostic classification and behavioral skills as variables. This design allowed for the gathering of data concerning the development of infants with a wide range of skills as well as the evaluation of the usefulness of diagnostic classification in the prediction of skill patterns. In addition, it was possible to evaluate the CAP itself as an assessment tool; what changes had to be made in order to assess a physically handicapped child versus one with Down's syndrome; what "new" information, needed by intervention program personnel, is provided by the CAP; and, how can this information be translated into a form useful to those personnel.

Subjects. As stated previously, 144 infants have been seen during the CAP project's testing. Of these, 62 were Down's syndrome, 21 were children with a primary motor impairment compounded by mental delay, 27 were developmentally delayed—infants who have no known organic problem but whose cognitive and/or

Table 11

Sample Breakdown by Age and Handicapped Group

Age	Down's Syndrome	Physically Impaired	Developmentally Delayed	Multi-Handicapped	Total
Year 1	28	0	7	9	44
Year 2	17	12	7	14	50
Year 3	17	9	13	11	50
TOTALS	62	21	27	34	144

physical development is slower than normal, and 34 multiply handicapped children. The multiply handicapped group included children with congenital rubella, cytomegalovirus, post meningitis, tuberous scherosis, arthrogryposis imperfecta, Sturge-Weber syndrome and Noonin syndrome. As can be seen in Table 11, the infants are reasonably well distributed through Year 1, Year 2 and Year 3 of life. Using Hollingshead's system for the determination of the family's socioeconomic status it was found that the subject population was distributed fairly evenly across the five categories of status. In addition, most of the mothers of the infants had a high school education or better.

Measures. The CAP is comprised of measures which assess the infant's skills in four developmental domains: cognitive, social, affective, and communicative. Following is a brief description of each measure - its purpose, structure, and the methods of scoring used. These measures are listed in Table 12.

Cognitive Development

1. The Bayley Scale of Infant Development - Mental Scale (Bayley, 1969)

The Bayley Scale serves as a standardized referent for the other measures, as well as a "ball park" estimate of a child's general level of functioning. The Mental Scale consists of 163 items appropriate for normal infants approximately 2 to 30 months of age. The competencies assessed on the Mental Scale include perceptual abilities, boject constancy and memory, language comprehension and production, cognitive abilities associated with the development of abstract thinking, and social abilities associated with interaction and imitation (Bayley, 1969).

The Bayley Mental Scale, as it was originally developed, is not entirely appropriate for handicapped populations. However, certain minor modifications in administration procedures (allowing more time for response to items, repeating items more than usual) and in the criteria for determination of basal and ceiling levels of functioning have rendered this scale usable with all but the most severely motor impaired infants in our sample.

Because most of the children in our sample are severely delayed or retarded, the traditional method of calculating a score for Bayley performance (a quotient based upon number of items passed and chronological age) was unusable. For this reason, our system for scoring the Bayley consists of computing the child's raw score (number of items passed) and then finding the normal age equivalent for this raw score (using 100 as average age-adequate score).

Work is also in progress on the development of a system of subscales for the Bayley which would provide more detailed information on the child's specific skills. Thus, the Bayley provides information on all developmental domains.

2. The Development of Visual Pursuit and the Permanence of Objects Scale (Uzgiris & Hunt, 1975)

This scale is designed to assess what Piaget has termed the concept of "object permanence," the understanding that objects have an existence of their own independent of the child's perception of or action upon those objects. The Uzgiris-

Table I2

Assessment Instruments in the Competency Assessment Profile Battery

Developmental Domains	Assessment Measures
Social	Mother-Infant Interaction
	Free Play
	Separation
	Reunion
	Bayley Scale Items
	Visual Self-Recognition
	Parent Questionnaire
Affective	Emotional Scale
	Temperament Questionnaire (Carey)
	Bayley Scale Items
Perceptual/Cognitive	Attentional Processes
	Visual & Auditory
	Social & Nonsocial
	Object Permanence Scale
	Means-Ends Scale
	Bayley Scale Items
Linguistic	CAP Language Questionnaire
	Bayley Scale Items
	Mother-Infant Vocalization Patterns

Hunt Scale is a series of stepwise items which involve searching for hidden objects and focuses on the individual, sequential landmarks in the development of object permanence.

The scale consists of 15 items, the earliest of which focus on the child's visual pursuit of objects. The next group of items look at the coordination of the child's visual following and his reaching for disappearing or hidden objects. The ability of the child to construct a mental image of an object that is no longer visible is next evidenced by his ability to follow displacements of an object under any of 3 different screens. The more advanced items on the scale involve "invisible displacements"--placing an object in a container and then hiding it under a screen. The final items involve sequential hiding of an object under 3 screens in a path, requiring the child to construct a mental image of the movement of an object.

The scoring system used by the CAP project for this scale is slightly different from the original system developed by Uzgiris and Hunt. Instead of basing a child's score solely on the final item passed, the CAP focuses on groups of items (or units) which require the same general object permanence concept. The child's score thus reflects his object permanence skills and is more consistent with the CAP's emphasis upon competencies, rather than developmental level.

3. The Development of Means for Obtaining Desired Environmental Events Scale (Uzgiris & Hunt, 1975)

This scale is designed to assess what an infant does in order to cause the occurrence of an interesting event or to obtain an object he desires. It taps the child's understanding of the means to an end as distinct from the end itself and his ability to construct his own means to a desired goal.

The Means-End Scale is composed of 12 situations, each of which is said to mark further development of an understanding of the means-ends relationship. The initial items of the scale require only the most basic coordination of means and ends--e.g., handwatching, visually directed grasping and repetition of actions producing an interesting spectacle. The child must use very familiar behavior schemes--reaching, grasping, banging--to obtain a desired goal. The middle group of items require that the child be able to construct the means to an end by using well-developed action schemes--e.g., pulling, grasping, reaching--in a novel circumstance; for example, the child must pull a pillow toward himself in order to attain an object resting on the pillow. For the final items of the scale, it is necessary that the child be able to recognize the appropriate means to an end and any hindrances to that end without the use of overt action--e.g., the child must be able to perceive, without direct manipulation, the need to compensate for the unsteadiness of a container before attempting to put a necklace into it.

As with the Object Permanence Scale, the CAP scoring system for this scale focuses on units of items which require the same basic concept. It thus reflects the child's competencies in his understanding means-end relationships.

4. The Attention Task (Lewis, 1971)

Four attention tasks are included in the CAP Battery. These tasks measure the orienting response to environmental stimuli. Of these, two tap response to auditory stimuli and two look at response to visual stimulation. Both "social" and "nonsocial" stimuli are used in each modality.

Two parameters developed by Lewis (1972) are being used to measure attention: (1) habituation to a redundant stimulus; and (2) recovery to a novel stimulus. The infant is first presented with the same stimulus six times; and on the seventh trial a novel stimulus is presented. If the infant is processing the information and recognizes the redundancy of the first six trials, attention should decrease across the repeated 6 trials (habituation). Attention should increase when the novel stimulus is presented (recovery) if the infant recognizes that the seventh stimulus is novel and unfamiliar.

The stimuli are presented to the child for 20 seconds, with a 20 second intertrial interval. The auditory stimuli are tones (6 the same and 1 novel) for the nonsocial condition and voices (6 the same and 1 novel) for the social condition. The visual stimuli are slides of colorful, geometric designs (6 the same and 1 novel) for the nonsocial condition and slides of people (6 the same and 1 novel) for the social condition. The attention tasks were administered in a specially designed portable booth used for testing in the field. The infant is seated on a caregiver's lap in front of the slide screen and the speaker.

Attention to the visual tasks is measured in two ways: fixation time (amount of time the child looks at the stimulus on the screen) and heart rate. Heart rate alone is used as the measure of attention on the auditory tasks. Heart rate decelerates when a child is attending and returns to baseline when s/he is no longer attending. For testing in the field a portable electrocardiograph was used to record heart rate.

The Attention Task yeilds quite a bit of information about specific cognitive skills—the child's attention to both auditory and visual stimuli in his environment, his recognition of redundancy, and his ability to discriminate between familiary and redundant stimuli. This information is derived from habituation and recovery scores which are calculated mathematically, as well as graphs of fixation and heart rate response for each task.

Because many handicapped children have a lower level of responsivity in general than normal children, we have also included a measure of general responsivity--response to onset or offset of the stimulus. By measuring response to onset and offset—i.e., to gross changes in the environment—in addition to actual processing of the particular information presented—we expect to be better able to detect even very low level responses to the environment which might otherwise be overlooked.

Social Development

1. The Mother-Infant Interaction Scale (Lewis & Lee-Painter, 1974)

The Mother-Infant Interaction Scale is an observational tool used to measure the amount and style of the interaction between a child and his mother, or primary caretaker. The basic format is a structured observation of the mother-child dyad in a playroom situation. Mother and child are in a room (in the portable booth, for field testing) with a chair, some magazines and a number of toys; and the mother is encouraged to interact with her child in any way she wishes--to do what she would do in her own home. During the session, a trained observer dictates all the behaviors of mother and child onto an audio tape. A transcription of this tape is eventually coded onto a behavior checklist.

The free play situation lasts 15 minutes. At the end of this time, cued by a prearranged signal, the mother leaves the room and the second situation--separation--begins. Separation lasts for a maximum of 3 minutes (shorter if the child becomes upset) and then the mother returns to the room. Her return marks the beginning of the third situation--reunion--which lasts for 5 minutes.

Scoring of the Mother-Infant Interaction Scale for group data purposes involves analysis of interaction patterns--who usually initiated interaction, the nature of most interactions (proximal or distal), frequency of different behavior in interaction sequences, frequency and length of interaction chains.

2. The Mirror Task (Brooks-Gunn & Lewis, 1975)

The Mirror Task measures self recognition, an important skill in the development of self knowledge and in understanding of the social world. This task is a structured observational tool which measures the child's response to several different situations.

In the first situation, the experimenter and mother (or other caregiver) direct the infant's attention to the mirror and the experimenter observes the infant's behaviors for approximately 30 seconds.

While the infant is looking at the mirror, the experimenter moves behind and to the side of the infant, moving into view in the mirror. The experimenter observes to see whether the infant notices her or not and how the child responds to the other person in the mirror.

For the next situation, the mother turns the child away from the mirror and places a mark of color (red on white infants and white on black infants) on the infant's nose, under the guise of wiping the child's face. The infant is then placed in front of the mirror again and the experimenter observes to see whether the infant notices the mark on his nose.

The mother then puts a mark on her own nose and picks up her child. The infant's behaviors in response to this final situation are observed.

Scoring of performance on this task focuses on changes in the child's behavior during each situation. The criterion response for self recognition is nose touching during the rouge condition. Other behavior changes, however, signify progress toward the development of self recognition skills. Scoring of individual subject's performance involves placing the child in one of four self recognition stages based upon his behavior during the four situations.

3. The Carey Scale (Carey, 1970)

The Carey Scale is a method for measuring infant temperament. The format of the scale is a questionnaire which is filled out by the mother or primary caregiver. This questionnaire consists of 70 statements, each having three choices for completion, which describe children's behaviors in a variety of situations which commonly occur in the child's daily life--e.g., feeding, interaction with strangers, bathing, etc. The three choices for each item describe an intense response pattern, mild response pattern, or a variable pattern.

Nine subscales comprise the Carey questionnaire, each of which taps a different aspect of temperament. These are:

1. Activity--level and extent of motor activity.
2. Rhythmicity--degree of regularity of bodily functions.
3. Approach--response to a new object or person in terms of whether the child accepts it or withdraws from it.
4. Adaptability--how the child responds to changes in the environment.
5. Threshold--sensitivity to stimuli.
6. Mood--general mood or disposition.
7. Intensity--energy level of responses.
8. Distractibility--degree to which the child can be diverted from what he is doing.
9. Persistence--the span of the child's attention and his persistence in an activity.

Several different scores are calculated from the Carey Scale. A mean score for each subscale is obtained, resulting in ratings of moderate, variable or intense for each of these temperamental characteristics. In addition, an overall score, based upon subscale ratings characterizes the child as an easy, intermediate or difficult baby. An easy child usually presents few problems in care and training while the difficult child requires a high degree of patience and consistency in his upbringing.

4. The Parent Questionnaire

This questionnaire includes general background questions about the child's developmental history, family composition, handicap, etc. The second part of this questionnaire addresses certain aspects of the child's social development--response to strangers and to separation from the mother, as well as early language development milestones. The final section asks the mother to compare her behavior and that of her infant during the mother-infant interaction session, with their usual behavior at home.

Affective Development

1. The CAP Socioemotional Scale (adapted from Lewis & Michalson, 1975).

The purpose of the Socioemotional Development Scale is to measure the young child's expression. The Socioemotional Development Scale is a structured observation of the mother and child which focuses on the child's emotional response to a variety of common situations which s/he would be likely to encounter in his day-to-day existence.

The scale consists of 14 items or situations, e.g., mother praises, stranger approaches, mother grabs toy. Each situation can be expected to elicit one or more of the five emotions being tapped by the scale. These five "socioemotional domains" are fear, anger/frustration, happiness, attachment/stress, and competence. The scale taps these domains by examining behaviors indicative of the five emotions as they occur in the task situations. Each behavior is scaled in terms of its intensity relative to other behaviors associated with the emotion being elicited by a particular situation.

Scoring of the Socioemotional Development Scale focuses on the level of the child's emotional response to each situational item and results in an intensity rating for each of the five emotions.

Linguistic Development

1. The CAP Receptive-Expressive Emergent Language Scale (adapted from Bzoch & League, 1970-71)

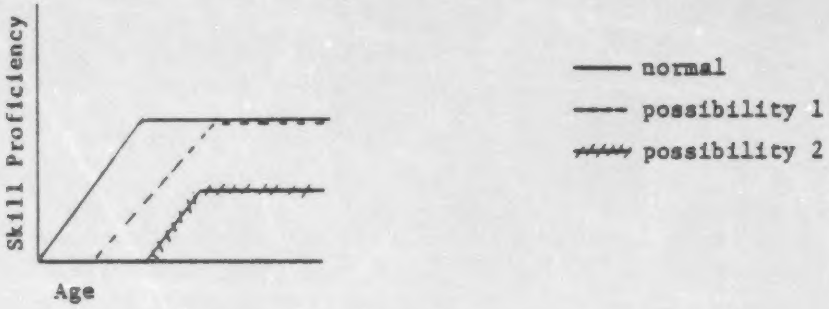
This scale assesses language development in both the receptive and expressive modes. This was important for accurate assessment of handicapped children--whose expressive language is usually delayed.

The format of this scale is a questionnaire which is administered to the mother or other primary caregiver by the experimenter. The receptive language items of this scale address the infant's behavioral responses and attention to noises and voices in his environment and his apparent recognition of familiar words--evidenced by head turning, other gestures, change in facial expression or cessation of activity. The expressive language part of the scale asks questions about earliest sounds (crying, vowel and consonant sounds), babbling, imitation of sounds or words, spontaneously used words, vocabulary size, use of sentences and understanding of certain semantic concepts.

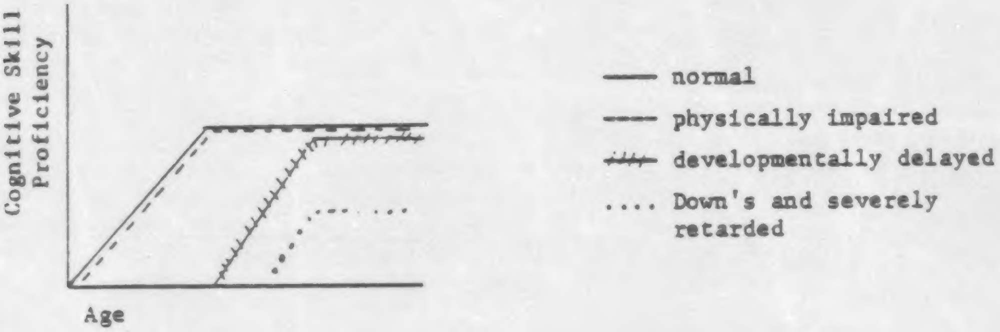
Results

Data analysis techniques. There are at least five areas of interest for the group data analysis: (1) developmental patterns of the skills for the total sample, (2) developmental patterns of the skills for select handicap groups, (3) relationships among skills, (4) functional rather than categorical analysis of the skills, and (5) comparisons with other exceptional populations and normal populations.

Developmental patterns. The development of skills will be examined as a function of age and compared to normal developmental functions. As stated earlier, normative data exist for all of the 10 skills being observed. The type and severity of developmental lags will be ascertained for handicapped infants in general. For example, a specific skill may develop fully in the handicapped infant, but later, or it may never develop fully in the handicapped infant. These two possibilities are illustrated below.



Developmental patterns in different handicapped groups. In addition to a general age analysis, the developmental patterns in the different handicapped groups will be analyzed, compared with one another, and compared with those of normal infants. Again, the type and severity of developmental lags will be assessed. In addition, the comparison of groups allows for a detailed picture of the relationships between disability and skill. Different patterns are likely to emerge. For example, severely retarded and Down's Syndrome infants may be quite similar to each other on a particular cognitive skill, which they never develop fully. A developmentally delayed infant might develop the skill, but later than a normal infant. And a physically impaired infant might show a similar pattern to that of a normal. These relationships are illustrated below.



Relationship among skills. The relationship of the 10 skills will also be assessed as part of the developmental pattern. Different skills may be related differently at different ages. For example, mother-infant interaction and perceptual-cognitive development may be related at all ages, whereas self recognition and perceptual cognitive development may only be related at the age at which self recognition first appears, but not earlier or later. Relationships among skills might also differ as a function of handicap category. For example, the cognitive skills may be highly interrelated for the severely retarded, but not related at all for the physically handicapped, since infants in the latter group may be similar to normal infants in cognitive functioning and there may be few relationships among cognitive skills for normal infants, or since some of the latter group's cognitive skills are affected by motivational factors which lead to low interrelationships.

Functional versus categorical analysis. Besides examining the skills according to handicap group, a functional analysis may be undertaken. That is, infants who are similar with respect to a skill are grouped together regardless of their disability. This analysis takes advantage of skill similarities (cluster analysis). Cluster analysis has been used primarily in personality research and is the basis for many personality typologies. It is appropriate for our sample since certain handicapped infants may function similarly although these commonalities have not been specified. The specification of commonalities has obvious implications for treatment and program design.

Comparison of handicapped population to other exceptional infants. Our sample will be compared to other infants in other Institute projects as well as to normal infants tested in our laboratory.

Preliminary Findings

Currently, several analyses of the data collected in the CAP Project are underway. The following factors are being examined with the between subject variables of age and handicapping condition being considered for each: (1) developmental patterns of skills for the total sample and description of each skill in terms of the various behaviors subsumed in each measure and various scoring systems possible for each measure; (2) developmental patterns of skills for select handicapped groups; (3) interrelationships among behaviors a) within each measure, b) within each developmental domain, and c) across developmental domains; (4) factor analyze the appropriate measures (Bayley, language tests, mother-infant interaction); (5) relationships among factor scores and other skills a) within each domain, and b) across domains; (6) regression techniques on concurrent cognitive and social functioning: (7) cluster analyze the subjects (as opposed to factor analyzing the measures) to see if diagnostic classifications or age groups are similar in terms of various skills a) within each domain, and b) across domains; and (8) comparisons with other exceptional and normal populations.

Preliminary results will be reported for background information, the Bayley Scales of Infant Development, the Uzgiris-Hunt Scales of Object Permanence, the Nonsocial Visual Attention Task, the Self Recognition Task, and the Mother-Infant Interaction observations. In addition, interrelationships of some of these measures will be discussed. Results of these tasks are presented to provide a sense of the diversity of data and the different scoring techniques which were developed.

A. Background Information. From an Environment x Status model it would be expected that characteristics of the infant's environment as well as variables such as birth complications would play a role in the determination of the child's skill level at a later point in time. These variables also are very important in any description of this group of infants. Discussion of these variables follows.

First, it is interesting to note the rate of birth and pregnancy complications in the total sample of handicapped infants. The rate of birth complications is 16% in the handicapped sample (N = 99) and is 11% (N = 97) for pregnancy complications. These percentages do not appear high until they are compared with the normal population. Data on normal children which were collected in this lab (the normal sample is from a 6-year longitudinal study funded by the National Institute of Child Health and Human Development) provide a comparison. The percentage of birth complications is only 9%, while that for pregnancy complications (if Caesareans are included) is 7%. These data point to greater numbers of birth and pregnancy complications in the handicapped versus the normal group of infants. Conclusions regarding the type of difficulties are impossible to draw given the low frequency of any one type of complication.

Second, since a major goal within special education involves early intervention with handicapped infants, it is necessary to investigate variables which partially determine how and when this intervention can take place. These variables include how old the child was when the handicap was noticed and by whom it was noticed as well as the age of the child at the time a diagnosis was made. Figure 13 presents the percentage of children by diagnosis whose handicap was noticed prior to 3 months of age. It is obvious from this figure that cerebral palsy and developmental delay are generally not noticed during the first 3 months of life. In fact it was not until 7 1/2 months that the majority of cerebral palsied infants were suspected of having a handicap and not until 5 months that the children later diagnosed as developmentally delayed were suspect. It is apparent that those handicaps with clear medical signs (i.e., Down's syndrome) are noticed earliest while those which are more difficult to detect are recognized later in the child's life.

When the issue of who notied the handicap is addressed (Table 13), large differences among handicap groups are apparent. The physician is most likely to notice that a child has Down's syndrome while the mother is apt to be the first to suspect a difficulty when the child later is diagnosed as cerebral palsied. Unexpectedly, this is not the case with developmentally delayed infants, as physician and mother are equally likely to notice the handicap.

In addition to examination of frequencies, several variables were correlated with one another. Table 14 presents the correlation matrix for all subjects, without division by diagnosis. Several of the correlations are very logical (eg., that maternal education and maternal employment were correlated) and also do not provide information about the child. Certain other correlations, however, do provide information relevant to diagnosis and remediation. Interestingly, age at which the handicap was noticed, age at which a diagnosis was made and age at entry to an infant intervention program were all negatively correlated with gestational age. In other words, the older the child was at notice of handicap, diagnosis and entry to a program the lower was the child's gestational age. In addition, these variables are also negatively correlated with birthweight. That these correlations are negative may say something about physician referral. While lower gestational age and lower birthweight should cue the physician in to potential problems of the child, the opposite appears to be the case.

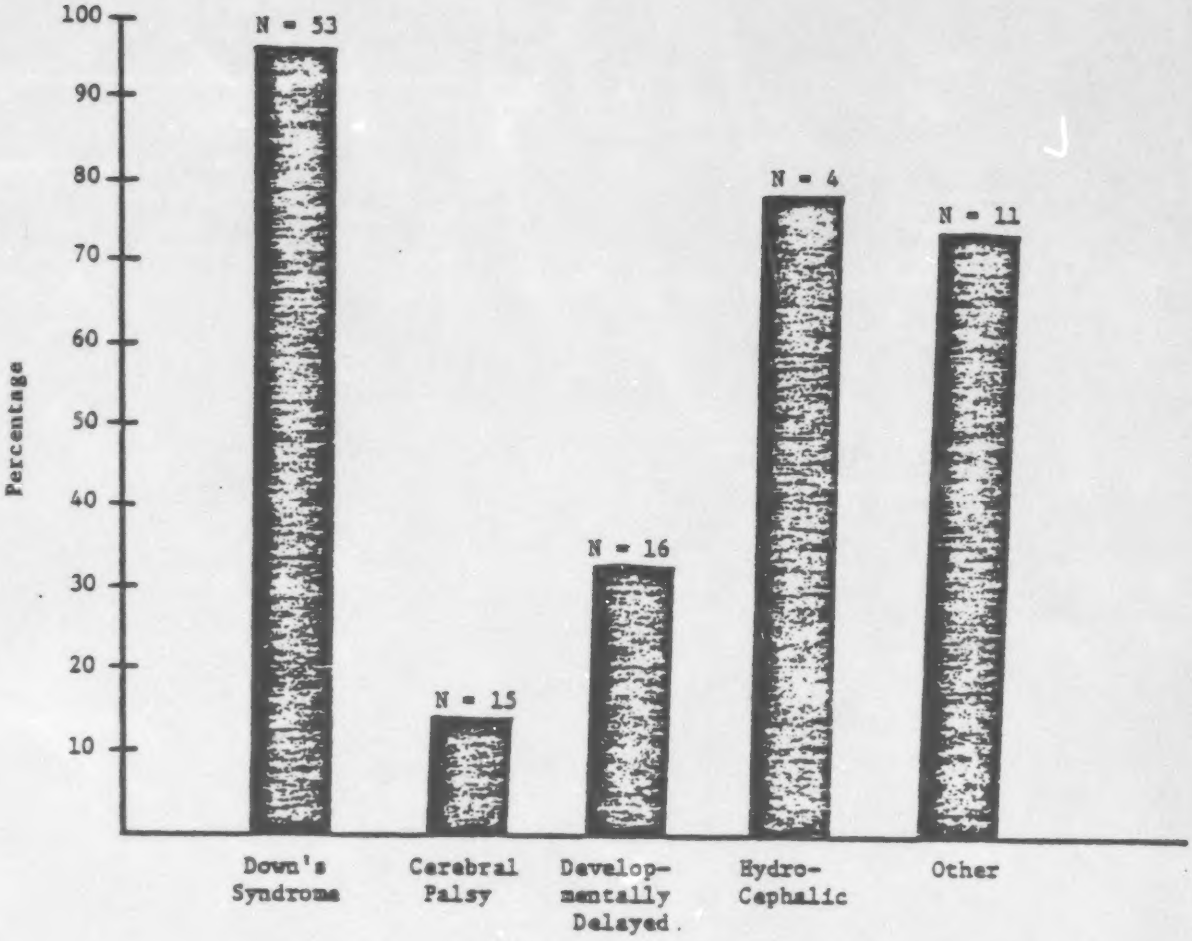


Figure 13. Percentage of children by diagnosis whose handicap was noticed prior to 3 months of age.

Table 13

Percentage of Children by Diagnosis
and Who Noticed the Handicap

Diagnosis	Who Noticed Handicap Doctor	Mother	Relative	Other	N
Down's Syndrome	94.3	1.9	-	3.8	53
Cerebral Palsy	26.7	60.0	13.3	-	15
Developmentally Delayed	43.8	43.8	12.5	-	16
Other	60.0	33.0	7.0	-	15

Table 14

Correlation Matrix - All Subjects

	Gestational Age	Birth Complications	Pregnancy Complications	Maternal Medication	Mother's Date of Birth	Mother's Education	Mother's Employment	Father's Date of Birth	Father's Education	SES	Age Handicap Noticed	Age at Diagnosis	Age at Entry to Program	Birthweight
Gestational Age	——													
Birth Complications	-0.02 (N=98)	——												
Pregnancy Complications	-0.07 (N=98)	0.19 (N=99)	——											
Maternal Medication	0.006 (N=98)	0.09 (N=98)	0.17* (N=98)											
Mother's Date of Birth	-0.14 (N=93)	-0.02 (N=94)	0.10 (N=94)	0.14 (N=93)	——									
Mother's Education	0.11 (N=95)	-0.03 (N=96)	0.0025 (N=96)	0.02 (N=95)	-0.08 (N=93)	——								
Mother's Employment	0.16 (N=91)	-0.06 (N=92)	0.007 (N=92)	-0.05 (N=91)	-0.19* (N=90)	0.39** (N=92)	——							
Father's Date of Birth	-0.07 (N=89)	0.08 (N=90)	0.23** (N=90)	0.12 (N=89)	0.79** (N=90)	0.01 (N=90)	-0.06 (N=88)	——						
Father's Education	0.14 (N=88)	0.006 (N=89)	-0.24 (N=89)	-0.19* (N=88)	-0.19* (N=87)	0.70** (N=89)	0.23** (N=87)	-0.22** (N=87)	——					
SES	-0.19* (N=89)	0.06 (N=90)	0.19* (N=90)	0.16 (N=89)	0.25** (N=88)	-0.63** (N=90)	-0.20** (N=88)	0.15 (N=88)	-0.81** (N=88)	——				
Age Handicap Noticed	-0.43** (N=98)	-0.14 (N=98)	-0.04 (N=98)	0.06 (N=98)	0.17* (N=93)	-0.09 (N=95)	-0.18* (N=91)	0.09 (N=89)	-0.11 (N=88)	0.16 (N=89)	——			
Age at Diagnosis	-0.30** (N=94)	-0.14 (N=95)	-0.03 (N=95)	0.04 (N=94)	0.17* (N=90)	0.10 (N=93)	-0.23** (N=88)	0.07 (N=86)	-0.09 (N=85)	0.13 (N=86)	0.83** (N=94)	——		
Age at Entry to Program	-0.31** (N=97)	-0.01 (N=95)	-0.003 (N=95)	0.08 (N=95)	-0.02 (N=91)	-0.21* (N=92)	-0.24** (N=89)	-0.05 (N=87)	-0.14 (N=85)	0.15 (N=87)	0.62** (N=95)	0.71** (N=91)	——	
Birthweight	0.73** (N=97)	0.04 (N=98)	0.04 (N=98)	0.07 (N=97)	-0.14 (N=93)	0.12 (N=95)	0.18* (N=91)	-0.18* (N=89)	0.15 (N=88)	-0.25** (N=89)	-0.36** (N=97)	-0.26** (N=94)	-0.28** (N=92)	---

* $p < .05$
** $p < .01$

Additional correlations demonstrate the power of the variable Socioeconomic Status (SES). Both gestational age and birthweight are highly negatively correlated with SES. It is apparent that the lower the SES of the parents, the lower the gestational age and birthweight of the infant. These correlations point to poorer prenatal care with lower SES. Socioeconomic status is also correlated with pregnancy complications, but not birth complications; thus further reinforcing this conclusion. Care of mother and infant during delivery seems not to vary with SES while prenatal care does. This may be due to inadequate health care delivery systems, lack of knowledge on the part of the mother and/or poorer prenatal care.

Surprisingly, pregnancy complications, while not correlated with maternal age, education or employment, are correlated with paternal date of birth and education. This is probably due to relationship of these variables with SES. It is still important not to downplay the influence of maternal variables since maternal employment is correlated with birthweight. In this sample nonworking mothers tended to have babies of lower birthweight than working mothers.

This discussion of background information makes apparent the need for earlier diagnosis of handicapped infants and emphasizes the need to improve prenatal health care to those mothers in lower socioeconomic strata.

B. Bayley Scales of Mental Development. The Bayley Scales of Mental Development provide two measures of cognitive development: The Mental Development Index (MDI) and the Age Equivalent Score. Since most of the children tested were not scoreable in terms of MDI, age equivalent scores were used in the analyses. Developmental trends in scores were determined by plotting chronological age and the age equivalent scores. These scatter plots are presented in Figures 14 Down's syndrome), 15 (physically impaired), and 16 (developmentally delayed). The slopes of the regresion line for obtained scores (age equivalent) and expected scores (normative scores, i.e., a child of 6 months was expected to have an age equivalent score of 6 months) were compared. Thus, an evaluation of the actual developmental trends in cognitive development for the various handicapped groups and an assessment of each group's deviation from the normal were possible with this method of analysis. The difference between the expected trends and obtained trends in cognitive development are significant for the Down's syndrome, physically impaired, and developmentally delayed infants ($F = 172.79$, $p < .001$; $F = 7.99$, $p < .01$ respectively), indicating that the age trends in Bayley scores for these children are different from the norm. These findings are not surprising. What is interesting are the different patterns seen in the three handicapped groups.

For the Down's syndrome infants, it is apparent that a delay in cognitive development is not really occurring until about 5 months of age (see Figure 14). Prior to this time, development is similar to that of a normal child. With increasing age, however, the deviation from the normal becomes greater with an apparent "leveling off" in development occurring at about 28 to 36 months of age.

Physically impaired children show a different pattern of cognitive development. In looking at the scatter plot in Figure 15, two distinct patterns of development seem to appear. The development of one group closely parallels that of normal children and further study may show that this group of children is not extremely physically or cognitively impaired (physical impairment will depress scores on the Bayley since the test relies heavily on motor skills at early ages). The second group of children show extreme delay in cognitive development and are in all likelihood severely impaired.

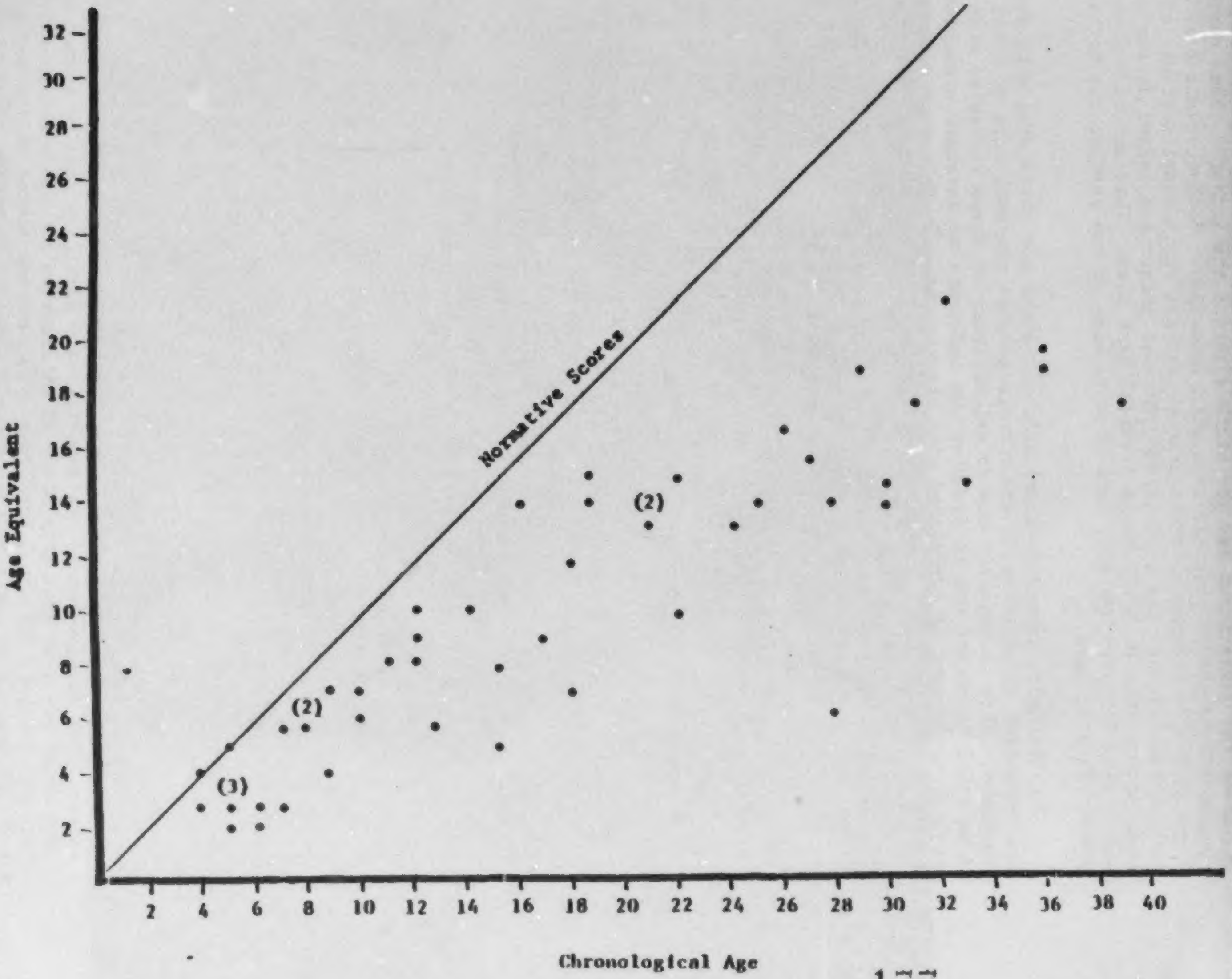


Figure 14. Age x Bayley age equivalent for Down's syndrome subjects.

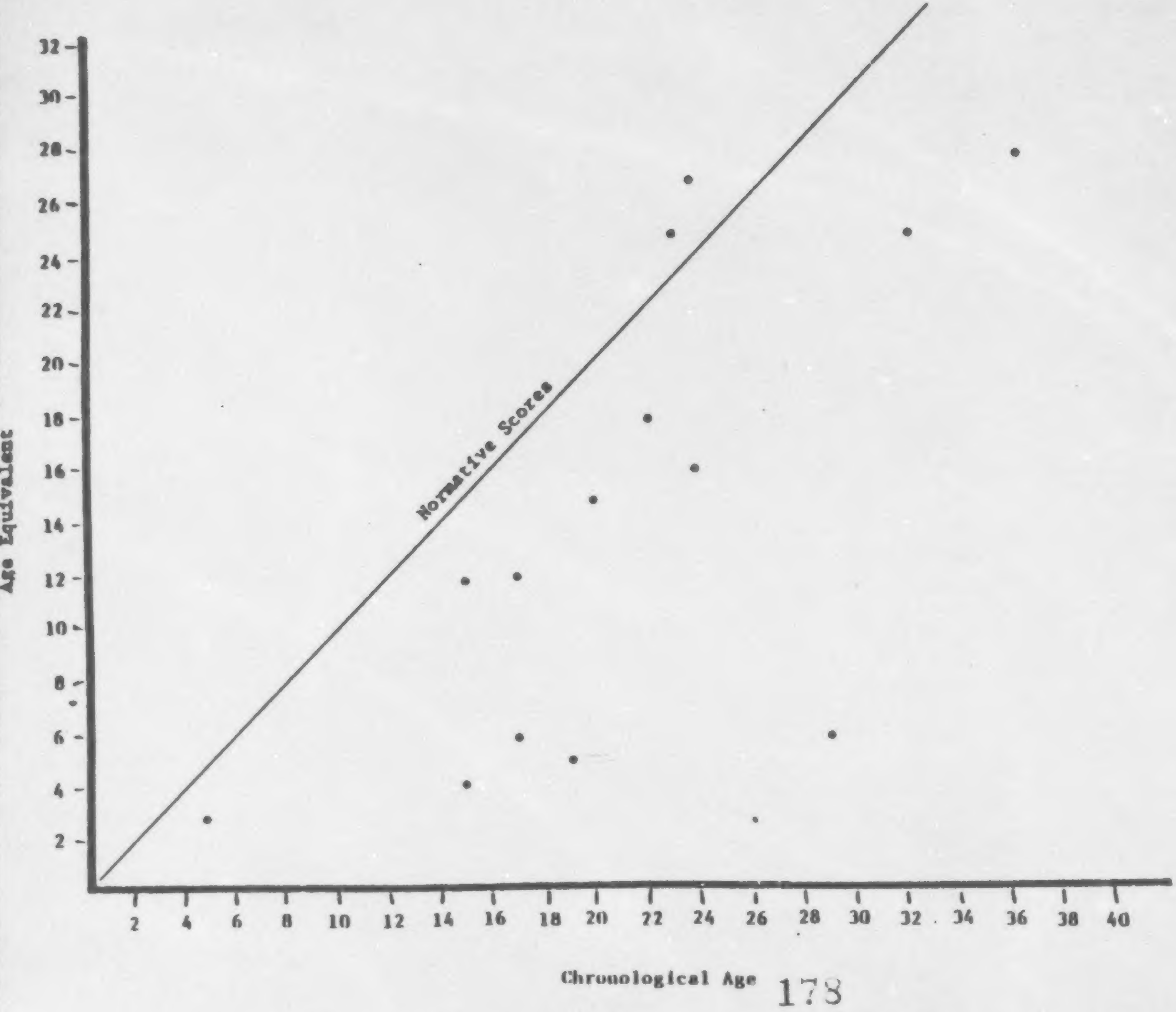


Figure 15. Chronological age x Bayley age equivalent for physically impaired subjects.

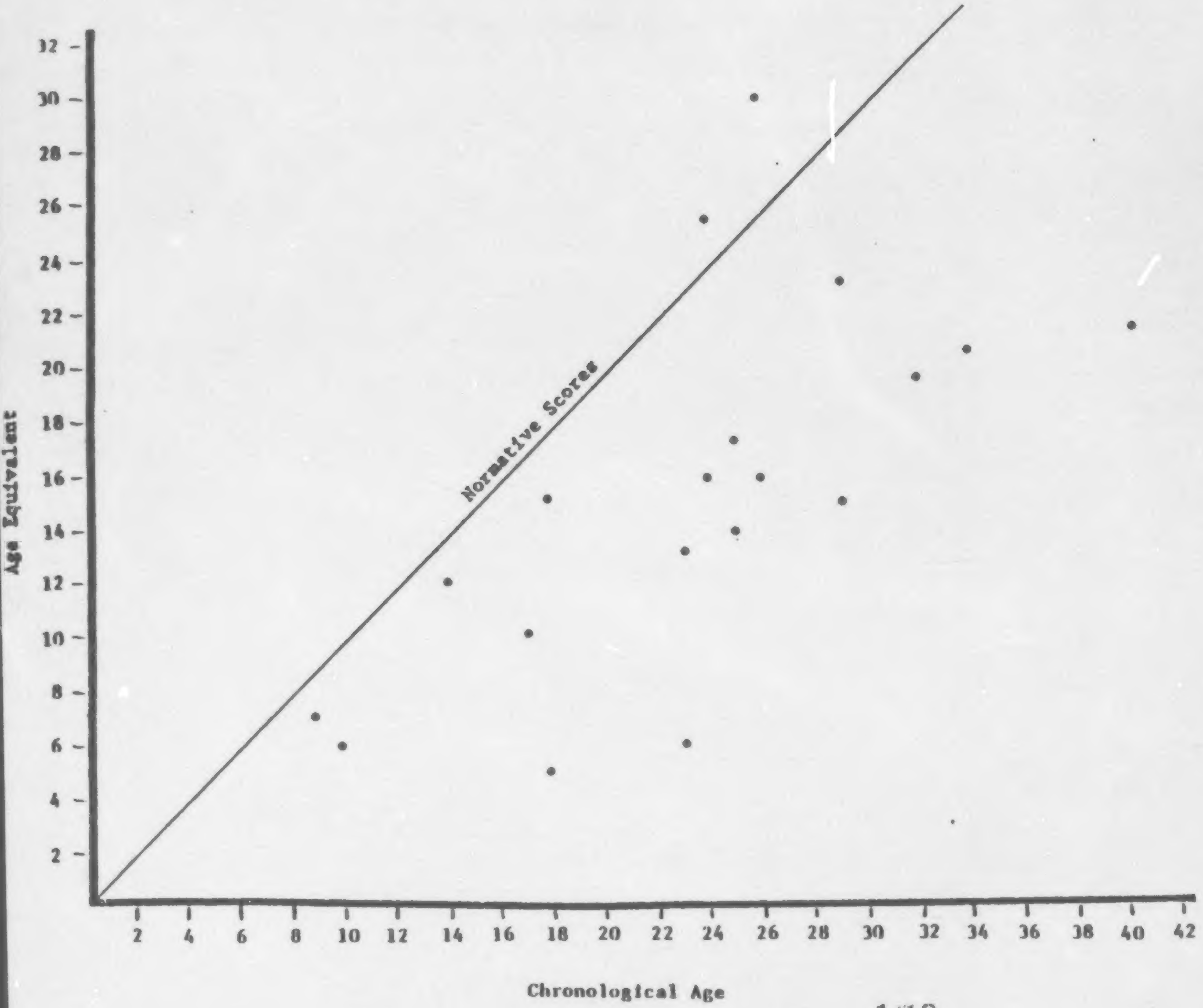


Figure 16. Chronological age x Bayley age equivalent for developmentally delayed subjects.

The developmentally delayed children show yet another pattern of development (see Figure 16). First, there is much greater variability in scores than is shown by infants with Down's syndrome. Given the numerous causes of developmental delay, such variability is not surprising. The general trend appears to be delayed development closely paralleling that of the normal. Interestingly, two children classified as developmentally delayed were accelerated with respect to normal development. In discussing these children with program personnel, it was apparent that these children were delayed when they first entered the program but have since "caught up." Such a change in a child's development can be detected only through repeated evaluation.

C. Object Permanence Scale. Since the Uzgiris-Hunt Object Permanence Scale has been shown to have Guttman-like properties, the data for each handicapped group were analyzed by looking at the number of items passed by chronological age and the number of items passed by age equivalent. In each case, the predicted number of items passed based upon age (chronological or age equivalent) was calculated by regression techniques and the significance of the difference between the predicted and actual number of items passed was computed.

A significant departure from the expected was seen for the Down's syndrome infants using both chronological age (F = 75.01, $p < .001$) and age equivalents as the independent variable (F = 24.70, $p < .001$). Interestingly, age equivalents are better predictors of object permanence scores (F = 30.16, $p < .001$) than is chronological age (F = 2.14, $p < .17$) in the physically impaired sample. In contrast, chronological age is a better predictor of object permanence (F = 18.02, $p < .0004$) than are age equivalents (F = 1.84, $p < .19$) for the developmentally delayed infants.

D. Attentional Patterns. At present attention data have been analyzed for only a subset of the total sample. Thus subjects whose data are reported here are 23 Down's syndrome infants ranging in age from three to thirty-one months. The attention task, as noted previously, consisted of six presentations of a redundant visual stimulus (20 straight colored lines) followed by one presentation of a novel stimulus (20 curved colored lines). There was a 20 second intertrial interval between stimulus presentations. Each stimulus was presented for 20 seconds. Attention to the slides was measured by recording visual fixation and heart rate change. The visual fixation data are reported here.

Two types of information can be derived from these data: 1) habituation, or decrement of the orienting response to redundant stimuli, and 2) recovery, or increase in attention to a novel stimuli. Habituation was examined first, by calculation of mean fixation time on each trial for each age group and second, by calculation of habituation scores for the Down's syndrome infants and comparison of these scores with those for normal infants. In addition, recovery to the novel stimulus was compared for Down's syndrome and normal infants.

Figure 17 presents fixation-time curves for each of the five age groups. As can be seen, the 3-6 and 9-13 month-olds showed relatively little fixation over all seven trials, while the other three groups showed moderate fixation. Habituation, although minimal, was evident for all but the youngest and oldest groups. The 3-6 month-olds not only did not habituate to the redundant stimulus, but actually showed an increase in fixation time across trials. Absence of habituation in the 29-31 month-olds was surprising, and may reflect the large variability in attentional behavior within this group. Recovery to the novel stimulus occurred in all but the 22-26 month-old group, but was minimal across all the groups.

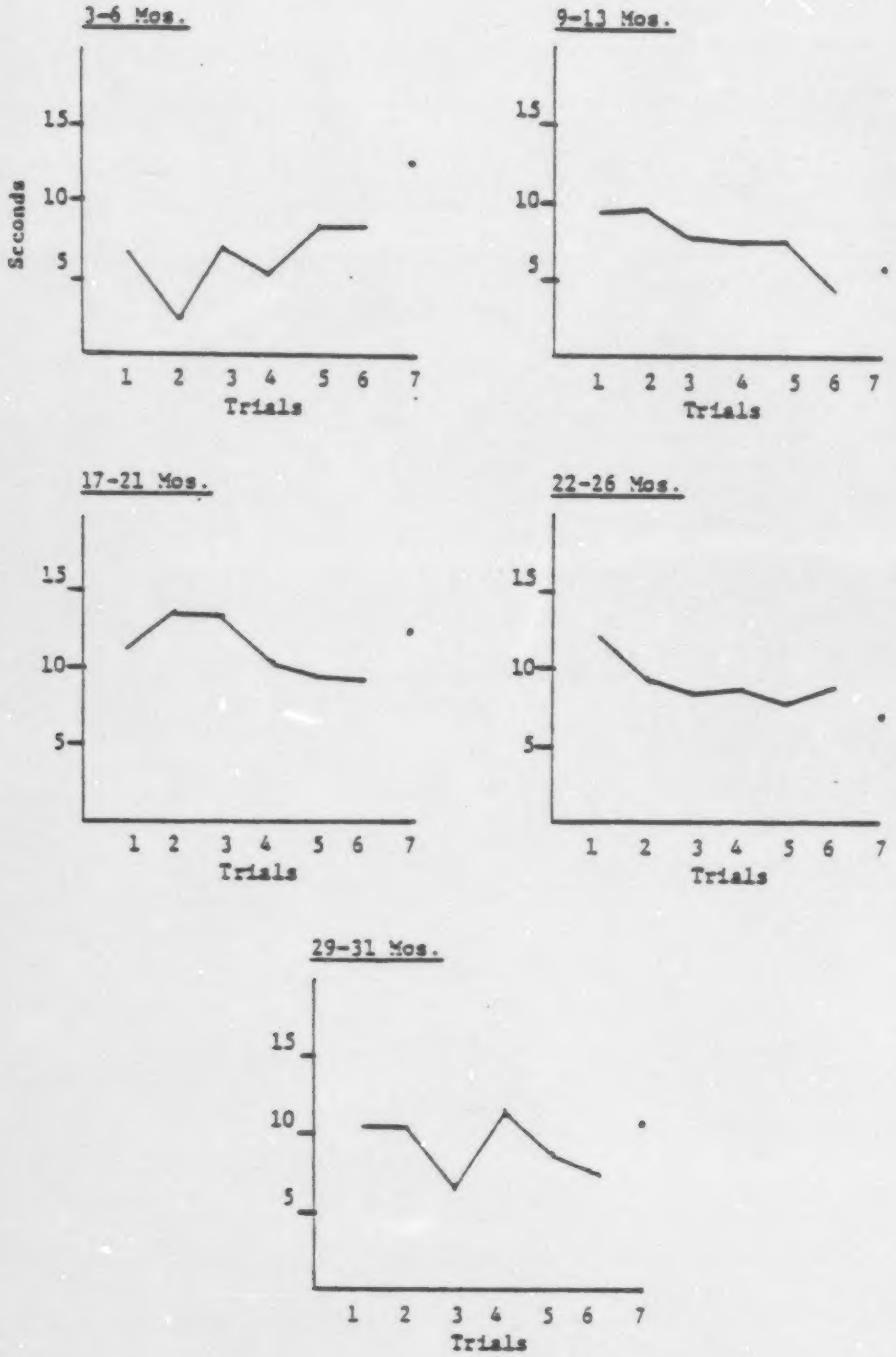


Figure 17. Fixation curves for Down's syndrome subjects by age.

Comparison of developmental trends in habituation for Down's syndrome and normal infants was done using habituation "scores". The habituation score represents the difference in a child's total fixation time between earlier and later redundant trials, divided by fixation time on the earlier trial(s).

Figure 18 presents mean habituation score data on normal infants based upon the composite results of several different habituation-recovery studies (Lewis, 1969). Two important age trends should be noted in these data. First, the marked difference in the habituation response for the 3 and 6 month-old groups points to an early change or shift in attentional behavior. The 3 month-olds showed no habituation whatsoever, while the 6 month-olds did show habituation. It appears in other words, that onset of habituation for normal infants occurs between 3 and 6 months. Second, there was an age-order effect in habituation for these normal samples, with amount of habituation increasing with age.

Both of these findings on normal infants' habituation are interesting in light of habituation data on the Down's syndrome infants. Figure 19 presents mean and median habituation score data for this sample. Interestingly, this figure indicates that the two youngest groups in the Down's syndrome sample also showed a shift or change in attentional behavior, marking onset of the habituation response. The 3-6 month-olds failed to habituation at all to the redundant stimulus, while the 9-12 month-olds did show habituation. Since all but one of the infants in the 3-6 month-old Down's syndrome group were, in fact 5-6 months of age, it appears that this transition from absence to presence of habituation occurred somewhat later in this sample than in normal samples. It is also important to note the relationship between age and habituation across all the Down's syndrome groups. Unlike the normal infants, the present sample did not show increasing habituation as a function of age. Indeed, after the initial shift marking onset of the habituation response amount of habituation actually decreased with age.

Comparison of response recovery data for normal and Down's syndrome infants also revealed different developmental trends in the two groups. Presented in figure 20 are recovery data for two samples of normal infants - measured by mean increase in fixation time to the novel stimulus. As can be seen, there was an age order effect in recovery, with amount of recovery increasing with age. Figure 21 shows mean and median recovery data for the Down's syndrome sample. In contrast to the normal infants, no relationship between age and amount of recovery was found for these infants.

These data suggest that, at least early in infancy, the sequence of development of information processing is similar for the normal and Down's syndrome infants. This similarity of development may not exist at later points in infancy, however, age trends in habituation following onset of the habituation response present a striking contrast between the normal and Down's syndrome infants. Amount of habituation increases with age for normal infants, but appears to decrease as a function of age for the Down's syndrome infants. This finding is difficult to interpret and may simply be an artifact of the small sample size and large intrasubject variability in this study.

The recovery data also suggest differences in the development of attentional and information processing skills. While amount of recovery increases significantly with age for normal infants, this was not the case in the present Down's syndrome sample.

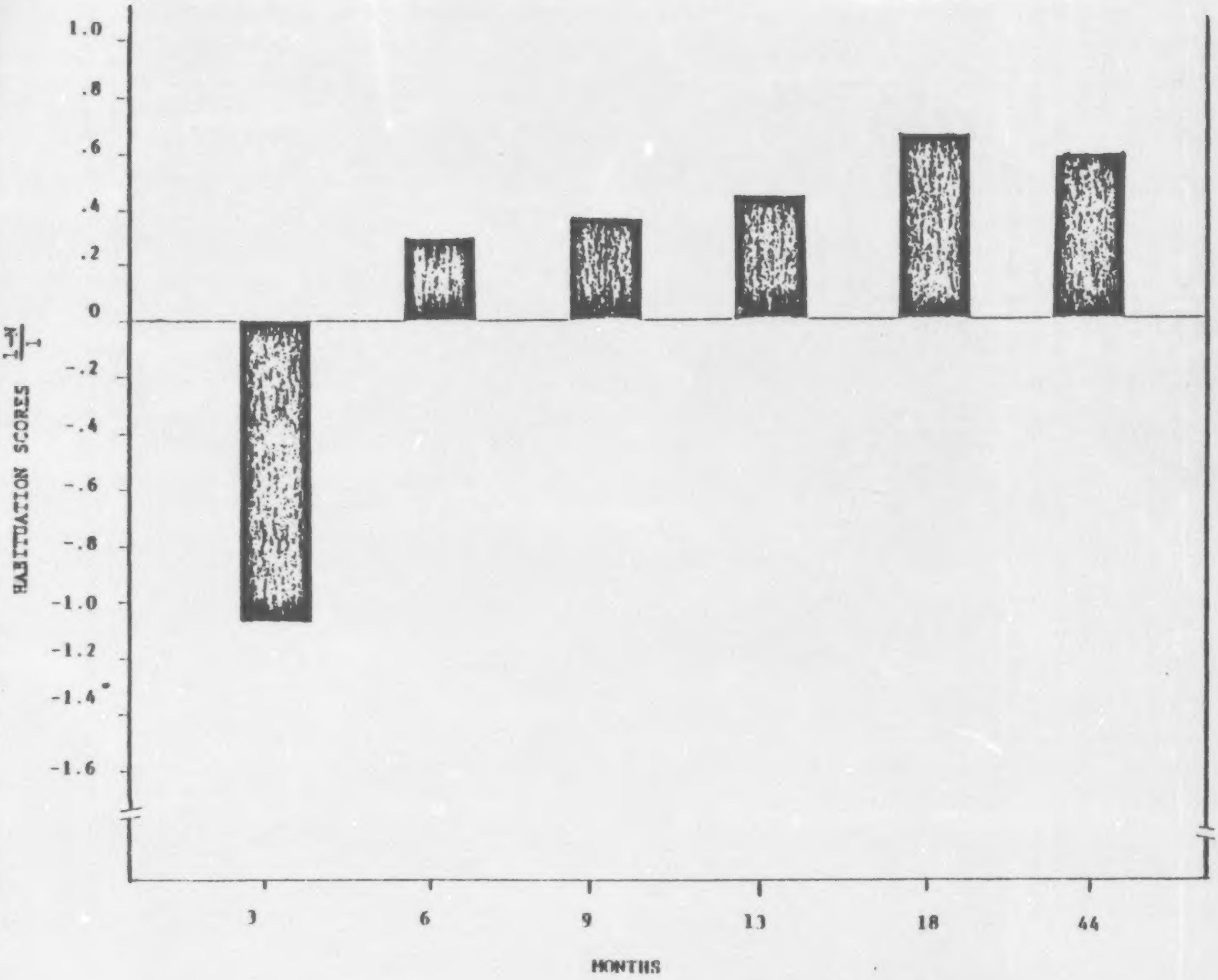


Figure 18. Habituation scores for normal infants by age in months.

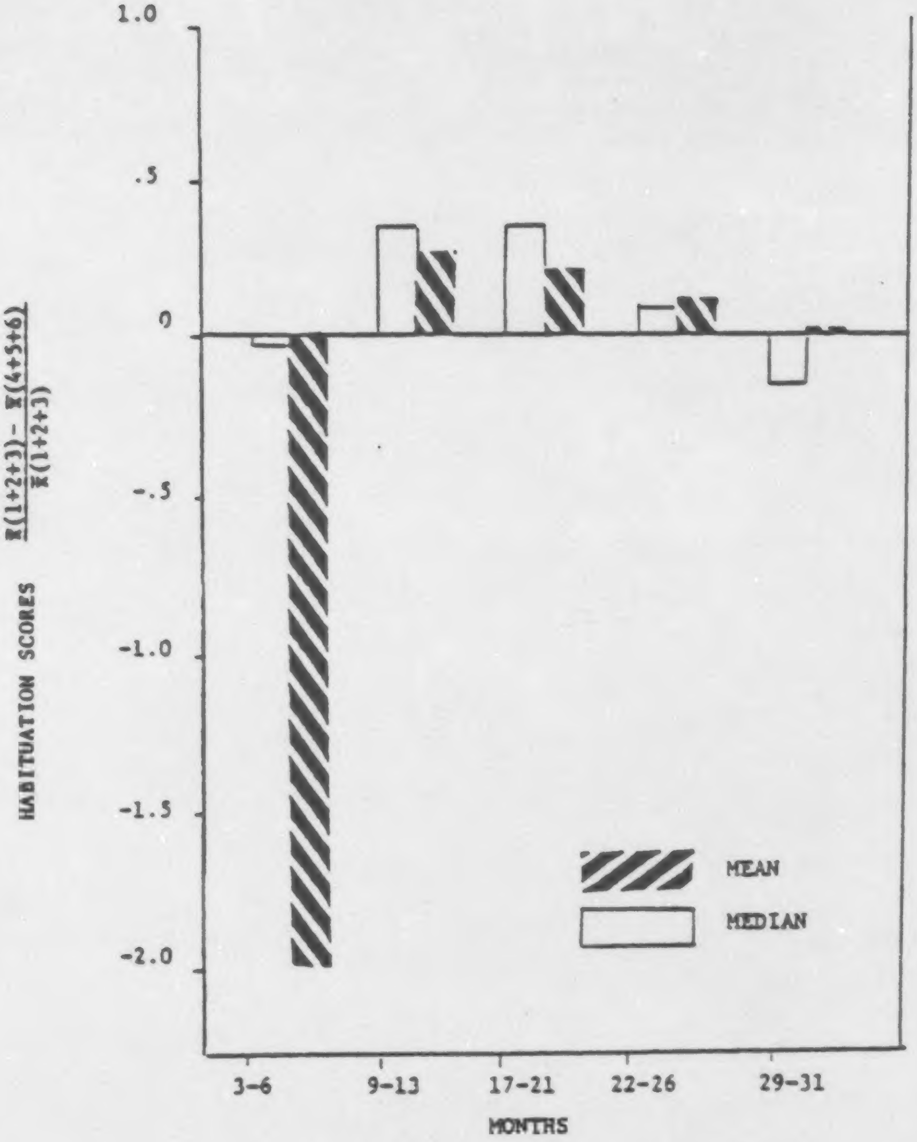


Figure 19. Mean and median habituation scores for Down's syndrome infants by age.

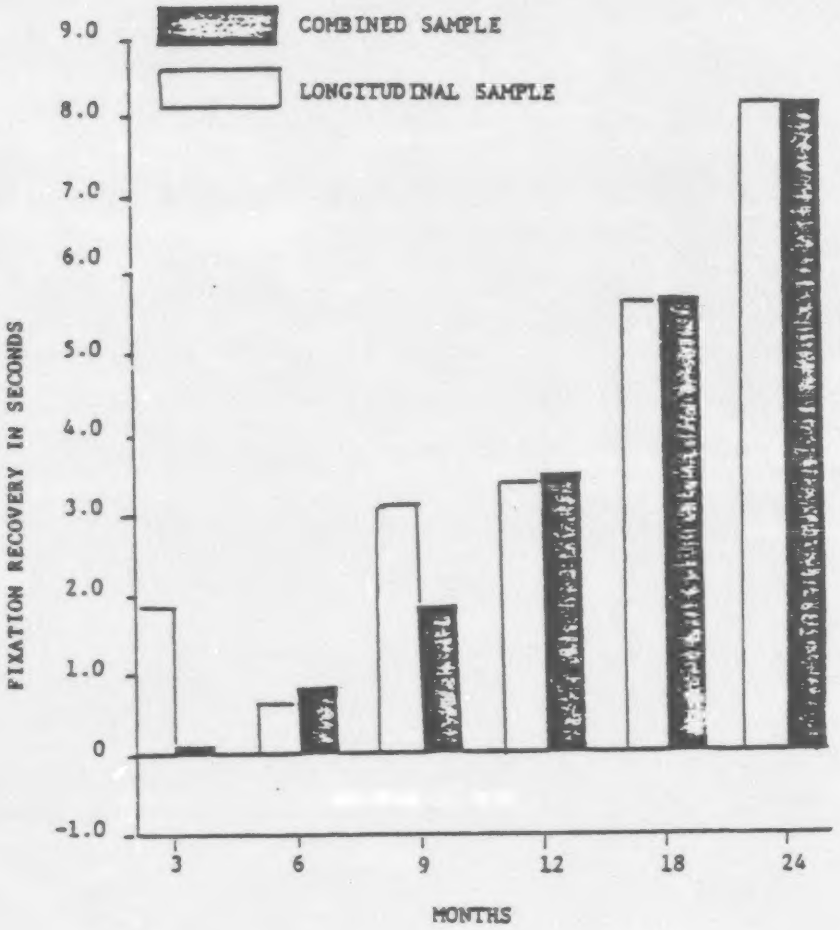


Figure 20. Mean recovery for normal infants by age.

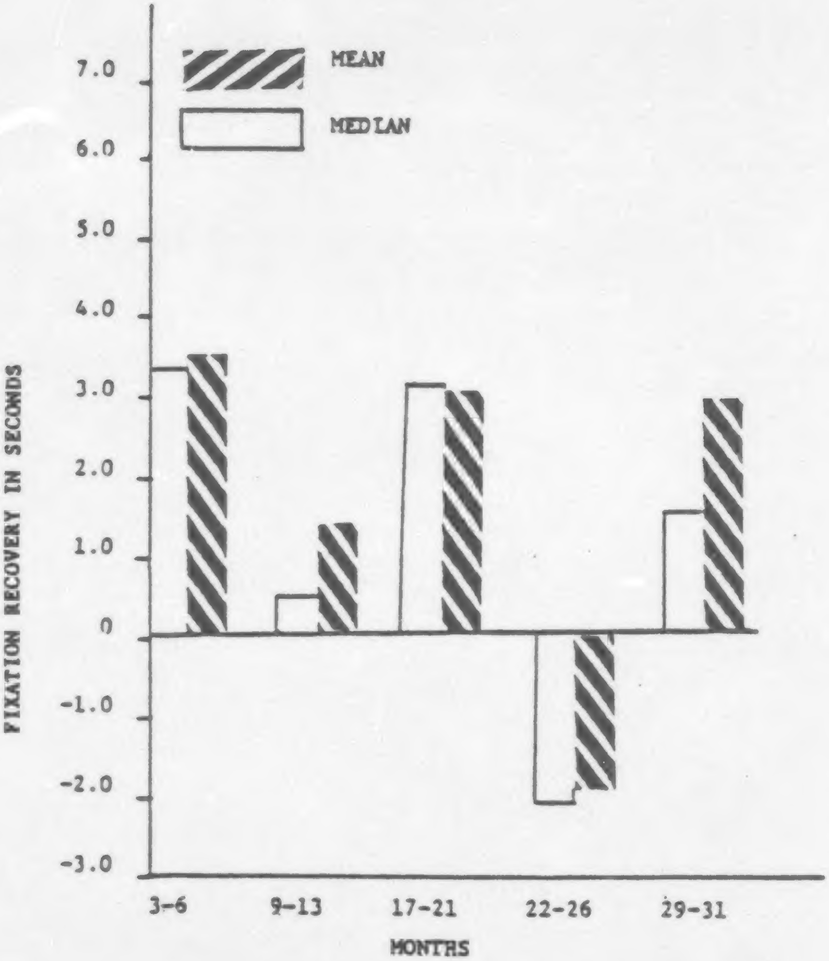


Figure 21 . Mean recovery for Down's syndrome infants by age.

E. Self Recognition. Although numerous behaviors are observed in this task, four behaviors which are especially indicative of self recognition will be reported here. These behaviors are: 1) touches nose in the rouge condition, 2) touches the mother's nose when she has rouge on it, 3) notices the second person in the mirror (person behind condition), and 4) turns to the person behind. These data are reported for Down's syndrome infants grouped by chronological age and by Bayley age equivalent scores and for a group of normal infants (Lewis & Brooks-Gunn, 1979). Nose-directed behavior was also compared for normal, Down's syndrome and other handicapped infants.

Touching or wiping the marked nose when the child sees her/himself in the mirror is indicative of visual self recognition. The percentages of Down's sundrome (N=61), other handicapped (includes cerebral palsy, developmental delay and other handicaps, N=59) and normal (N=95) touching their marked nose are presented in Figure 22 by age groups. As can be seen, Down's syndrome infants differ from normal infants but do not differ from other handicapped infants. These results make clear that any claim that the differences observed between the Down's and normal infants were based on Down's per se would be incorrect and misleading. Rather, these results would lead us to conclude that any dysfunction, Down's or others, results in similar performance which differ from that of normals (Lewis & Brooks-Gunn, 1980).

To examine the relationship of self recognition to cognition (as measured by age equivalents derived from the Bayley), percentages are presented for the Down's syndrome infants by chronological age and age equivalent in Figure 23. When age equivalents rather than chronological ages were used, no differences in mark directed behavior between the normal and Down's syndrome infants were found: 13% of the Down's syndrome versus 25% of the normal infants touched their noses at 13 to 18 months, and 80% versus 67% did so at 19 to 24 months. Thus, age equivalence is more important than chronological age in the expression of mark-directed behavior.

The second mark-directed behavior examined was maternal mark recognition, and the percentages for this behavior by age and infant group are presented in Figure 24. The patterns were not as clear-cut for this measure as the last: In normal infants under one year of age, 40% noticed the mark on their mother and over one year, 75% did so. Without age equivalents taken into account, touching the mark on the mother did not increase over age. A significant age-related increase was seen when age equivalents were used: The increase occurred between 13 to 18 and 19 to 24 months of age, 6 months after it occurred in the normal sample.

Finally, noticing the person behind and turning to the person behind were also examined. Infants' responses to having a person behind them but represented in the mirror are thought to be age-related (Bertenthal & Fischer, 1978). In our sample (see Table 15), the number of Down's syndrome infants noticing their mother decreased with chronological age (from 100% at 7 to 12 months to 47% at 25 to 36 months) and with age equivalents (80% at 7 to 12 months to 60% at 19 to 24 months). However, of those who noticed the mother, actually turning toward her increased dramatically with age (20% at 7 to 12 months to 100% at 25 to 36 months) and with age equivalents (25% at 7 to 12 months to 67% at 19 to 24 months). The age equivalents did result in a somewhat larger percentage of the infants in the second year of life turning toward the mother (when the 13- to 18- and 19- to 24-month-olds are combined: 83% versus 57%).

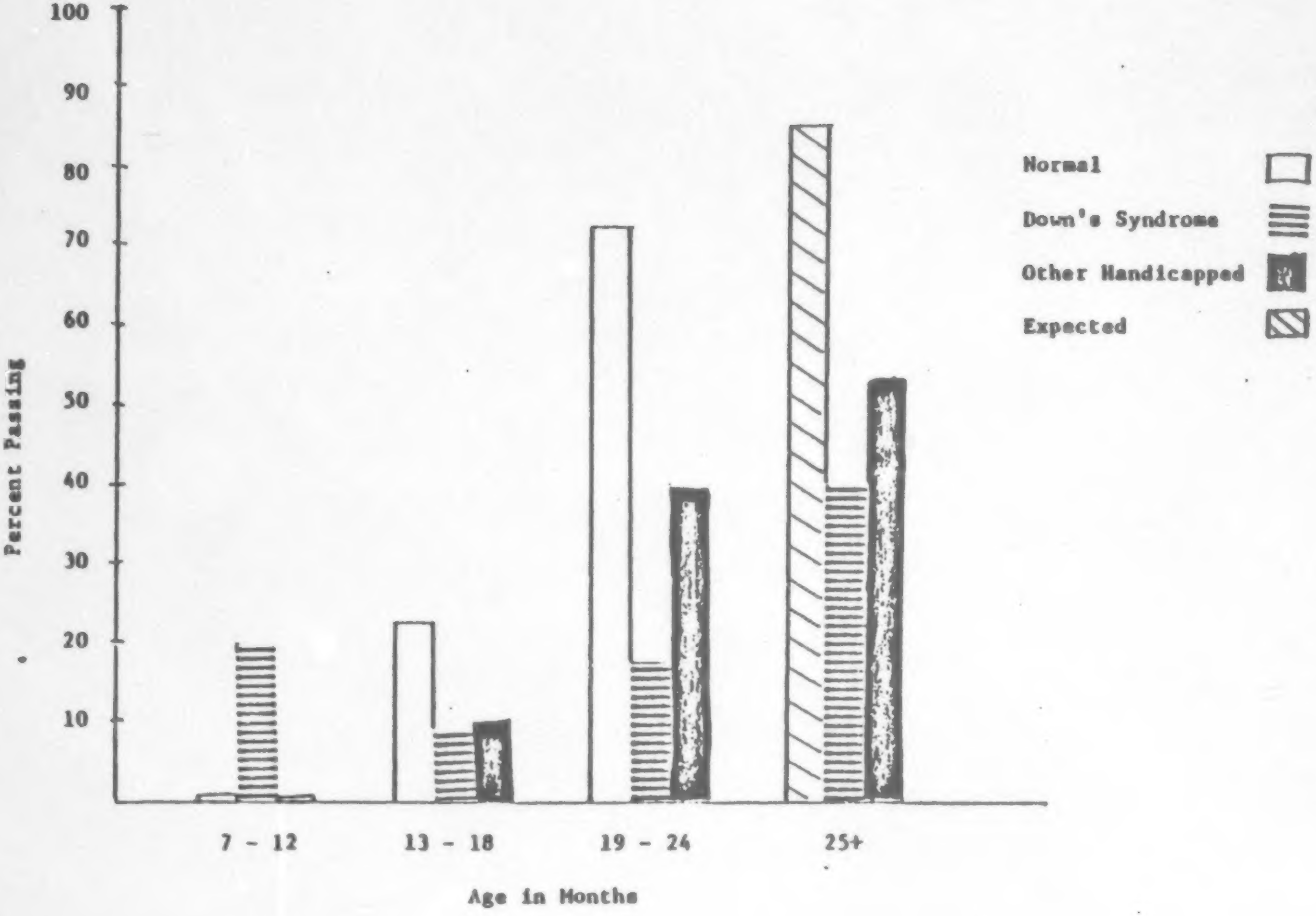


Figure 22. Mark-Directed Behavior: Normal, Down's Syndrome and Other Handicapped

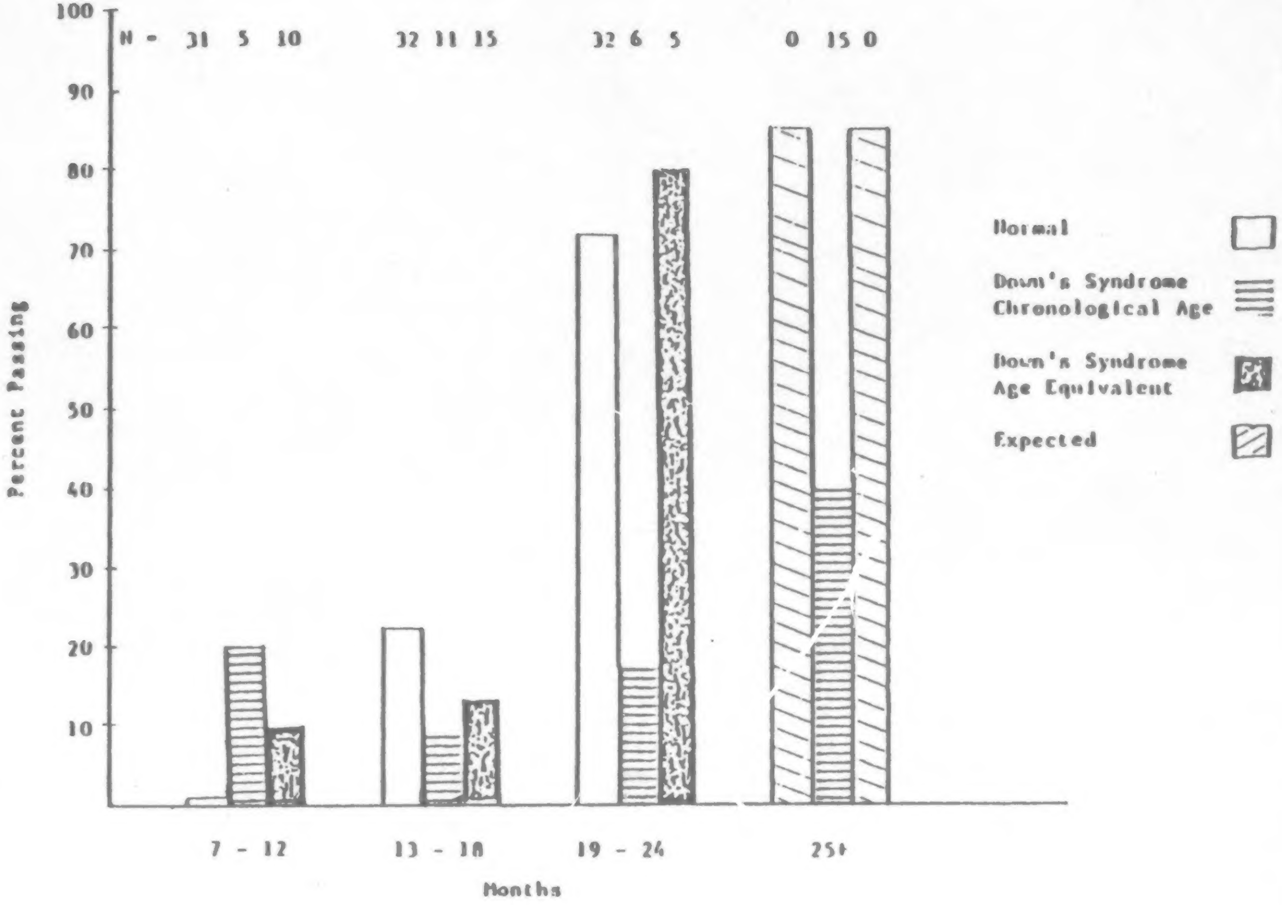


Figure 23. Mirror Task: Mark Directed Behavior

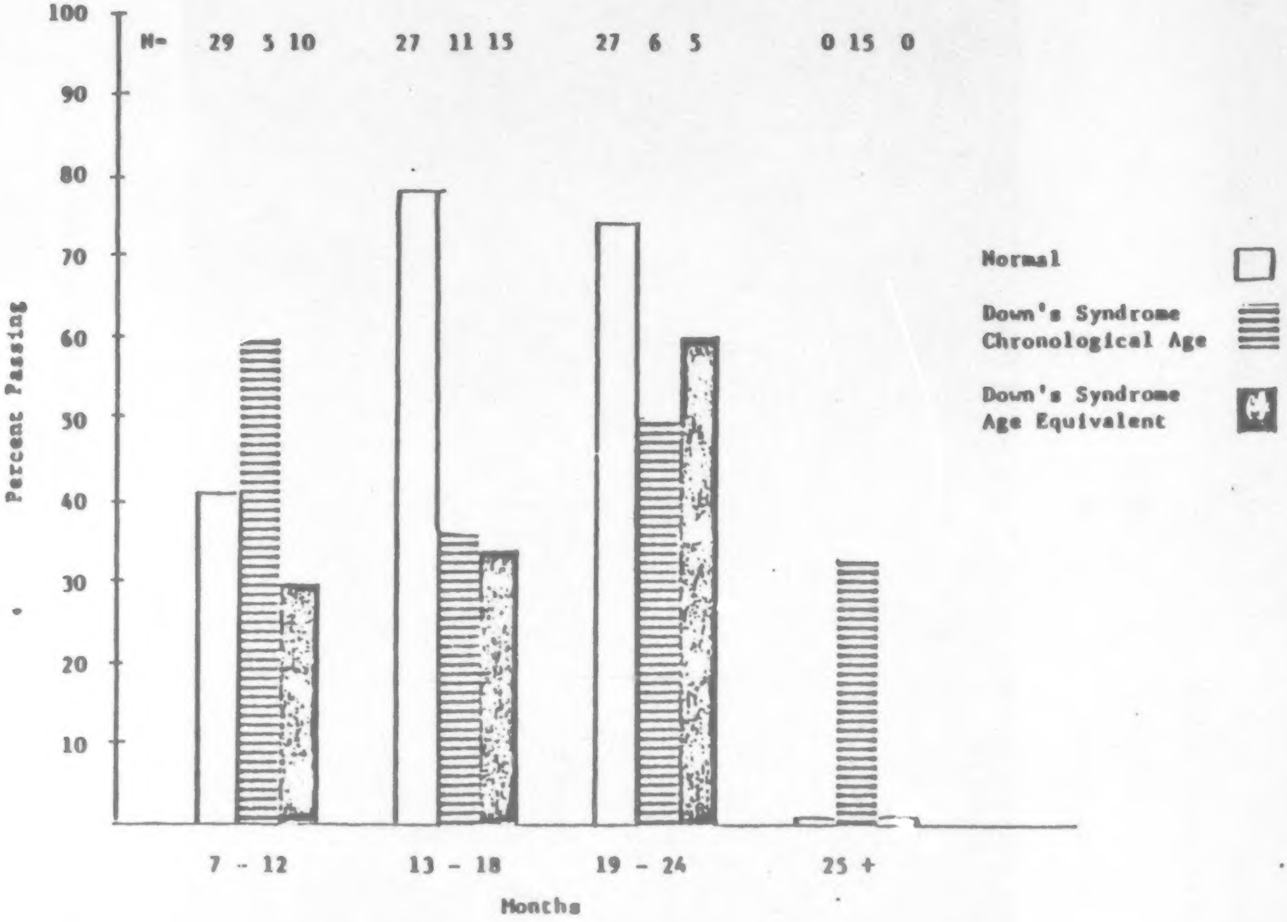


Figure 24. Mirror Task: Maternal Mark

Table 15

Mirror Task: Percentage of Down's Syndrome Subjects Exhibiting Selected Behaviors by Chronological Age and Age Equivalents

	Age in Months				
Behavior	7-12	13-18	19-24	25+	Total
Notices Person Behind					
Chronological Age	100	73	67	47	54
Age Equivalent	80	64	60	—	69
Turns to Person Behind (of those who noticed)					
Chronological Age	20*	75	33*	100	67
Age Equivalent	25	89	67*	—	60
Number of Subjects					
Chronological Age	5	11	6*	14	36
Age Equivalent	10	14	5	—	29
Normal	31	32	32	—	95

*Percentages in which only one or two infants exhibited the target behavior

Although the normal sample did not receive the Person Behind Conditions, data from other sources suggest that normal infants acquire this competency somewhat earlier. Bertenthal and Fischer (1978) report that this response is seen in most infants by 15 months, and in a study where a person silently approached an infant seated before a simultaneous television image of the approach, 9- to 12-month-olds turned in 54% of the trials, 15- to 18-month-olds in 43%, and 21- to 24-month-olds in 48% (Lewis & Brooks-Gunn, 1979).

F. Carey Scales of Infant Temperament. Analysis of the Carey Scale produces scores for each of the nine temperament subscales. Table 16 gives mean subscale scores for Down's syndrome and other handicapped subjects by Bayley age equivalent (3.5–8.5 months). Included on this table are data on normal children from Carey (1970), thus providing a comparison. Some general conclusions may be drawn from these data. With the exception of the subscales Approach, Mood, and Distractibility, the Down's syndrome subjects are more similar to the normal infants than they are to infants with other handicaps. On the three subscales mentioned above Down's syndrome and other handicapped infants are more similar to each other than either is to the scores for normal infants. Interestingly, the variability of scores for infants with handicaps other than Down's syndrome is greater than for either of the other two groups on virtually all of the subscales.

G. Mother Infant Interaction. Infants and their mothers were escorted to a small playroom (10 x 6 feet) which contained eight toys, a chair, and several magazines, and the mothers were told to do as they wished. They were observed through a one-way mirror for fifteen minutes, and the observer dictated the ongoing behaviors and interactions onto an audio tape that was later transcribed and coded. These transcriptions were divided into 10-second periods.

Eleven maternal and 16 infant behaviors, representing distal, proximal, and toy play categories, were recorded. In order to tap the interactive quality of the relationship, three types of behavior were recorded: 1) Occurrence, an ongoing or non-interactive behavior that serves neither as an initiation nor as a response to the other dyad member; 2) Initiation, any behavior that results in a response from the other dyad member, and 3) Response, any behavior that immediately follows and is linked in a meaningful way to behavior emitted by the other dyad member. Thus, the recording of interactive behaviors was reciprocal. More than one interaction could be recorded within a 10-second period.

Figure 25 presents the mean frequencies of maternal initiate and maternal response. As can be seen, the mothers of Down's syndrome infants initiated more than did mothers of normals. Maternal initiation increased in the normal sample but not in the Down's syndrome sample, even when equivalent age was taken into account. No differences were found between chronological age and age equivalent. Maternal responsivity increased with age in both samples and in the Down's syndrome infants when equivalent age was taken into account, with these increases being significant. No differences were found for the Down's syndrome sample by chronological age and equivalent age.

Figure 26 presents the initiation and response data as a proportion of total behavior. The maternal initiation data increased over age in the normal sample but not in the Down's syndrome sample, either for chronological age or age equivalent. Maternal initiation was higher in the Down's syndrome than the normal sam-

Table 16

Mean Temperament Scores for Handicapped and Normal Samples

Temperament Category	Down's Syndrome		Other Handicaps			
	Age Equivalent 3.5-8.5 months [A]		Age Equivalent 3.5-8.5 months [B]		Carey (1970) [C]	
	M	SD	M	SD	M	SD
Activity	.41	.34	.91	.50	.52	.32
Rhythmicity	.64	.50	.74	.55	.53	.46
Adaptability	.38	.29	.43	.36	.35	.26
Approach	.74	.25	.75	.39	.48	.35
Threshold	1.19	.44	.87	.56	1.08	.39
Intensity	1.08	.21	1.21	.55	1.05	.32
Mood	.51	.24	.56	.22	.40	.25
Distractibility	.47	.29	.49	.24	.57	.32
Persistence	.79	.36	1.15	.42	.69	.38

A. N = 14
B. N = 8
C. N = 101
D. The range of possible scores is from zero to 1 for each subscale.

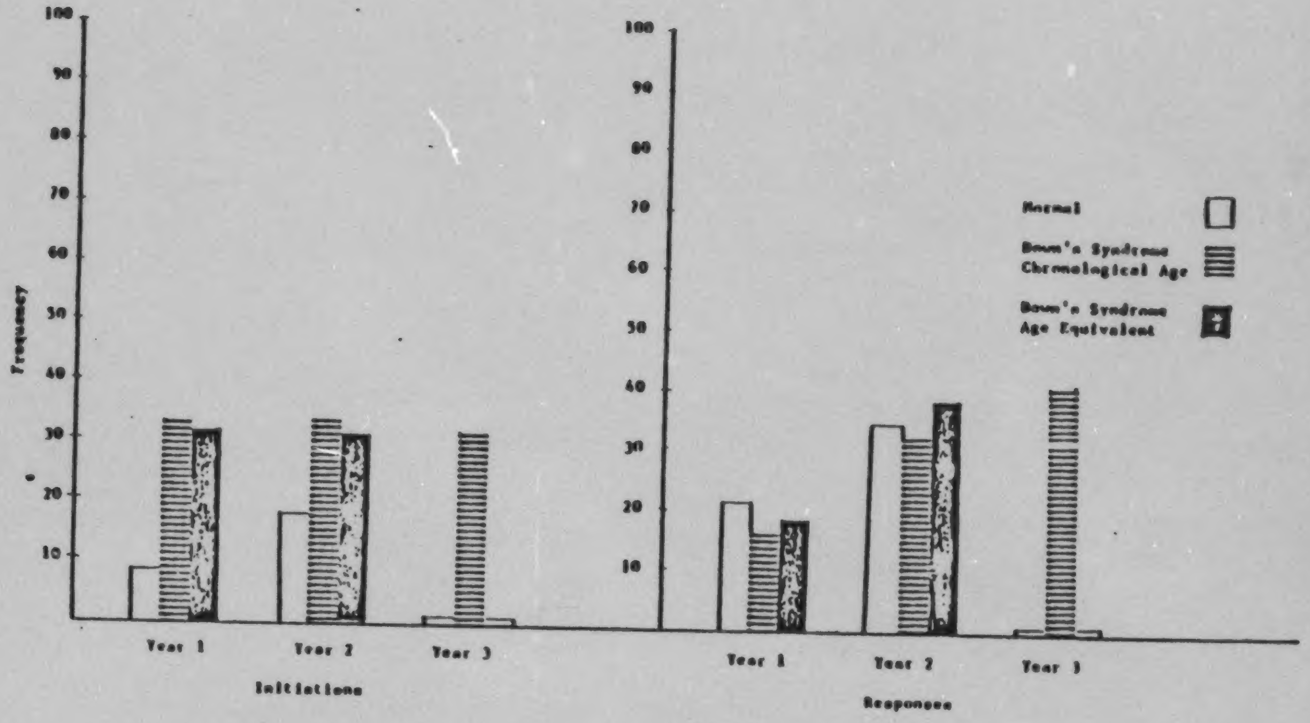


Figure 25. Mother-Infant Complex Interactions for Down's Syndrome: Initiations and Responses

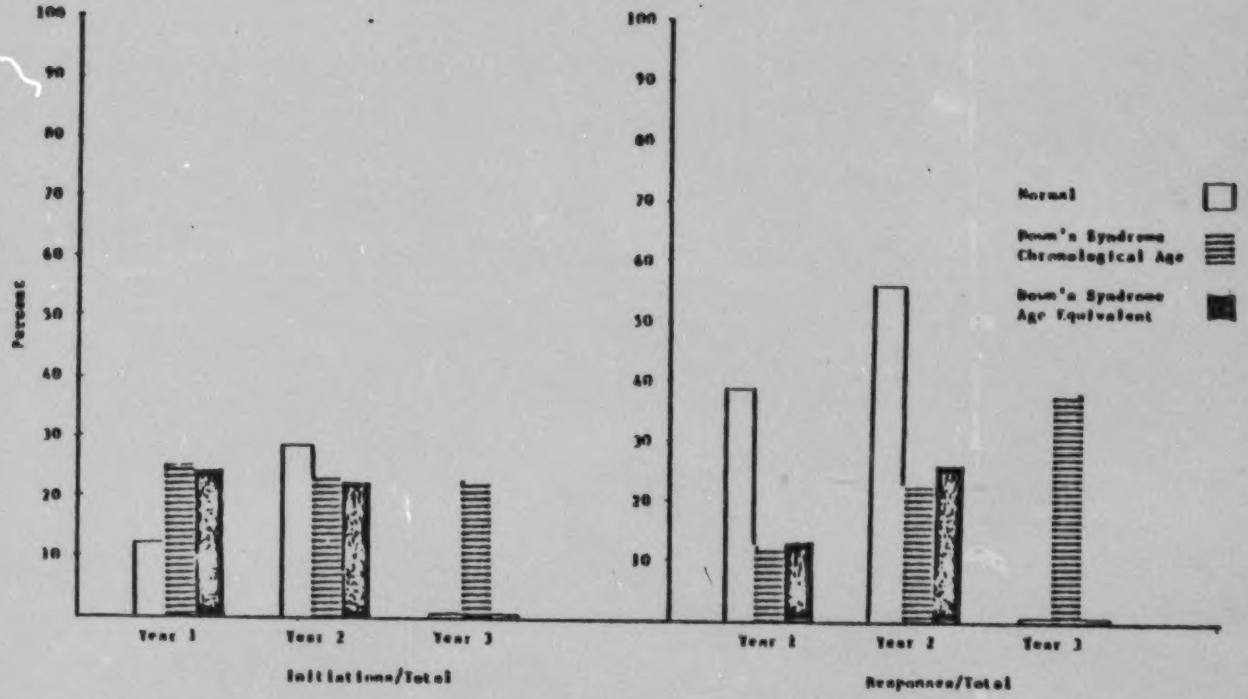


Figure 26. Mother-Infant Complex Interactions for Down's Syndrome: Initiations/Total and Responses/Total

ple at 12 months even when taking age equivalent into account. The proportion of maternal responding increased over age in both samples and in the Down's syndrome age equivalent group. Differences were found between the normal and Down's syndrome infants (both in terms of chronological age and age equivalent), with mothers of normal infants responding more than mothers of the Down's syndrome infants. No differences were found between the Down's syndrome infants as categorized by chronological age and age equivalent.

Figure 27 presents the initiation-response data in a third way: proportion of all interactions that are spent initiating and responding. Maternal initiations increased with age in the normal sample and decreased with age in the Down's syndrome sample. Maternal initiations differed as a function of sample, with mothers of Down's syndrome infants, both in terms of chronological age and age equivalent, initiating more than mothers of normal infants. No differences were found between chronological age and age equivalent in the Down's syndrome sample. Conversely, maternal responsivity decreased with age in the normal sample and increased with age in the Down's syndrome sample. Even with this difference, mothers of normal infants were proportionately more responsive than mothers of Down's syndrome infants, even when age equivalent was taken into account. As in all the analyses reported thus far, no differences were found for Down's syndrome infants in terms of chronological age and age equivalent.

. In addition to these comparisons, comparisons among normal, Down's syndrome and other handicapped infants at age 12 and 24 months were made. These data are presented in Figures 28-31. As noted in discussion of the self recognition data, it is apparent that Down's syndrome and other handicapped infants are very similar to one another and that both differ from the normal. This is true whether or not one looks at chronological age or age equivalent.

These data lead to a very important theoretical point: differences between normal children and children with known handicapping syndromes cannot be attributed to the general attributes of the child unless we include other groups of dysfunctional children who do not show the same behavior. Thus, if a normal group is compared to a Down's group, differences between them cannot be attributed to Down's unless we can show they are unique to Down's syndrome. This requires at least a third group of children. Our task, then, is to explore the process which marks differences between normal and dysfunctional children rather than to apply any particular attributed to a biologically-derived label of dysfunction.

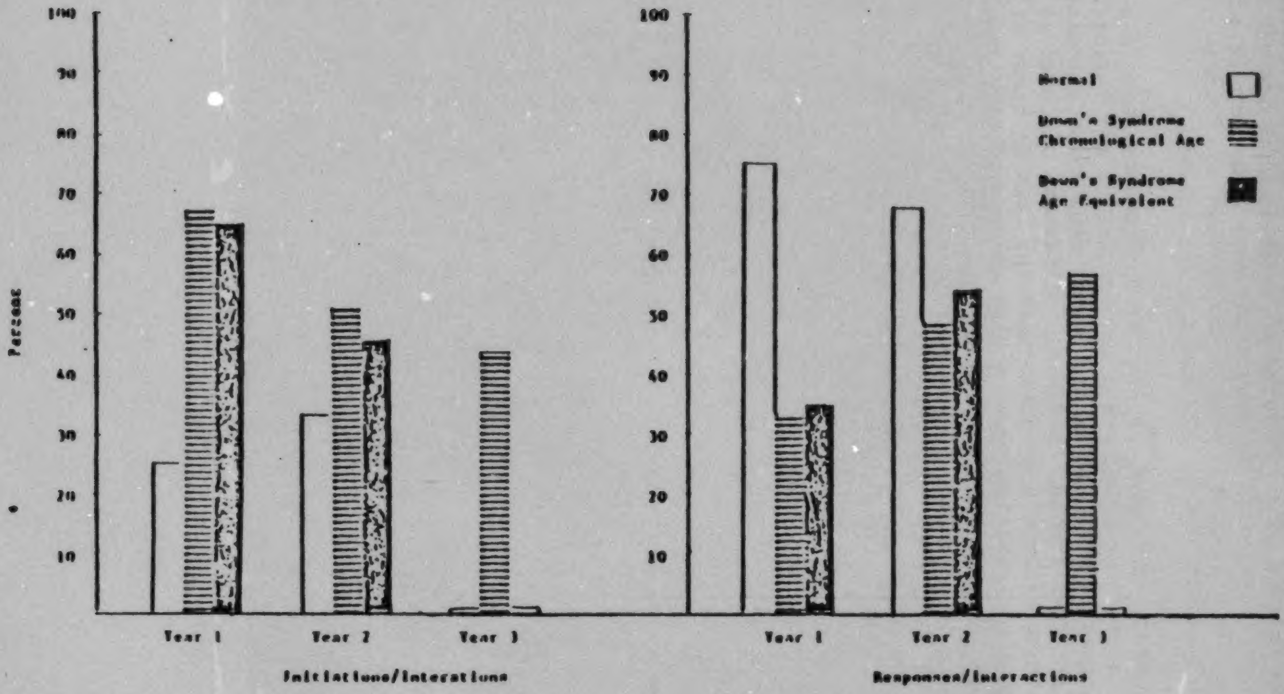


Figure 27. Mother-Infant Complex Interactions for Down's Syndrome: Initiations/Interactions and Responses/Interactions

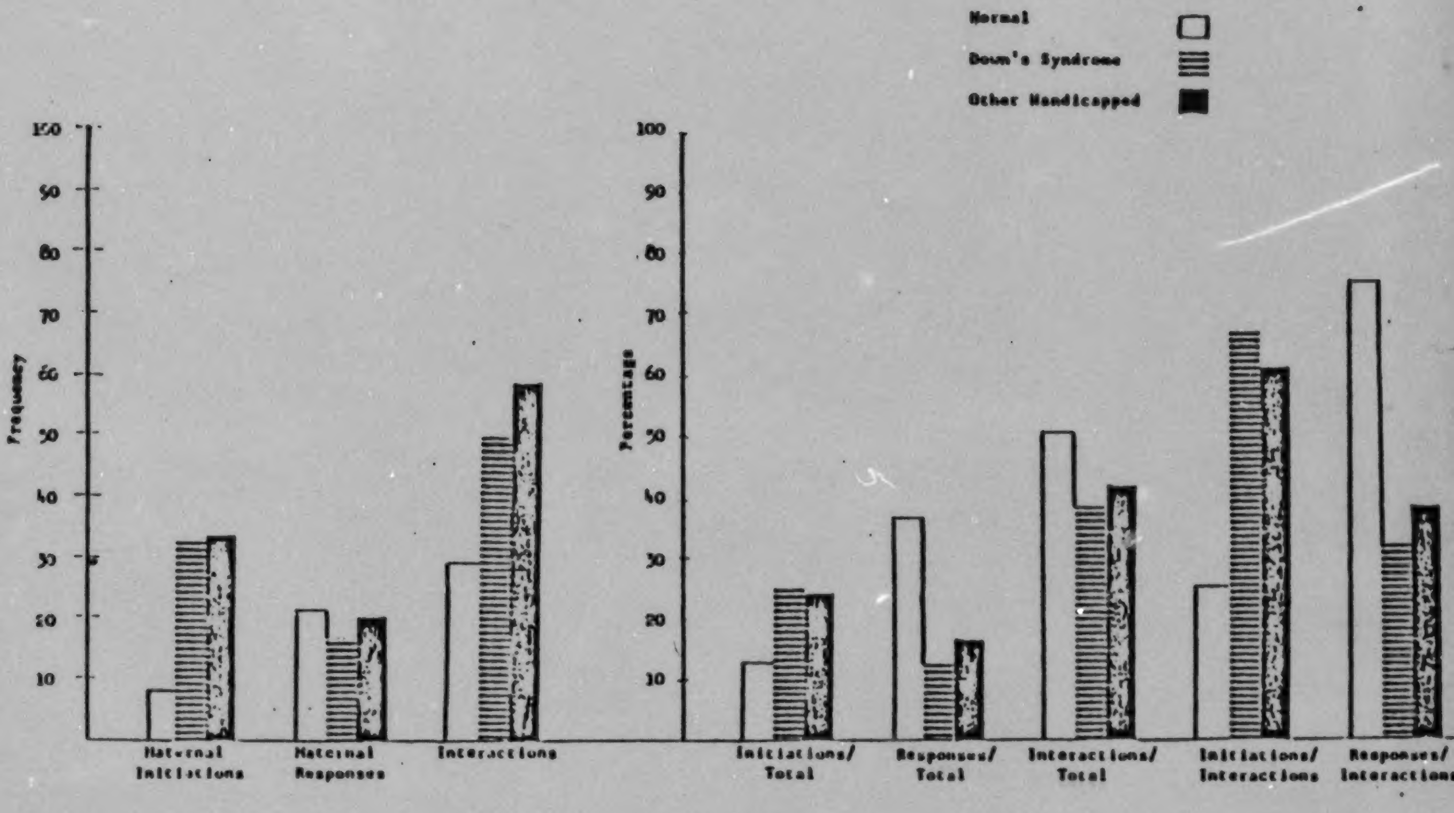


Figure 28· Mother-Infant Complex Interactions at Chronological Age 12 Months for Normal, Down's Syndrome and Other Handicapped.

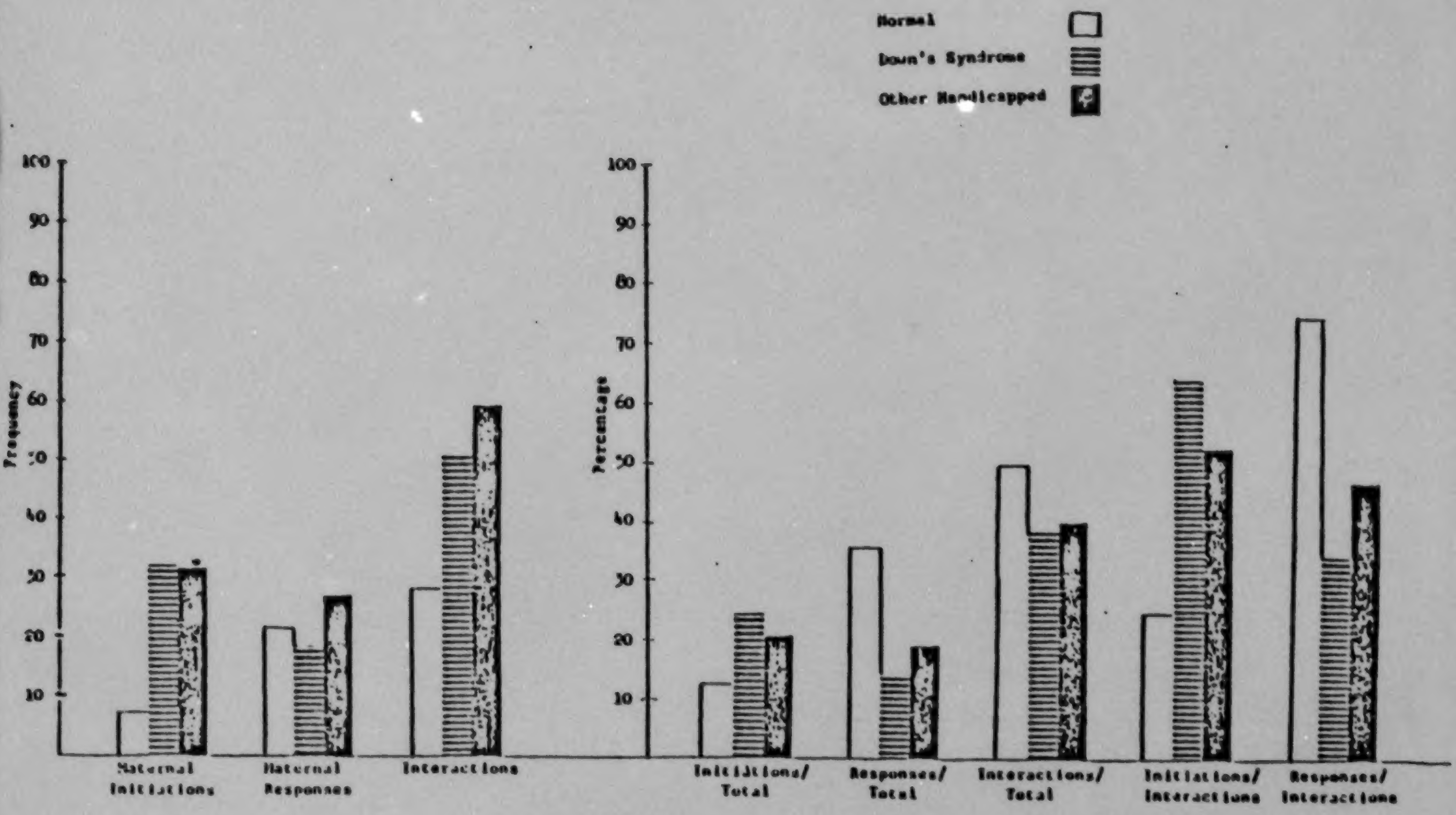


Figure 29. Mother-Infant Complex Interactions at 12 Months for Normal, Down's Syndrome and Other Handicapped--Age Corrected.

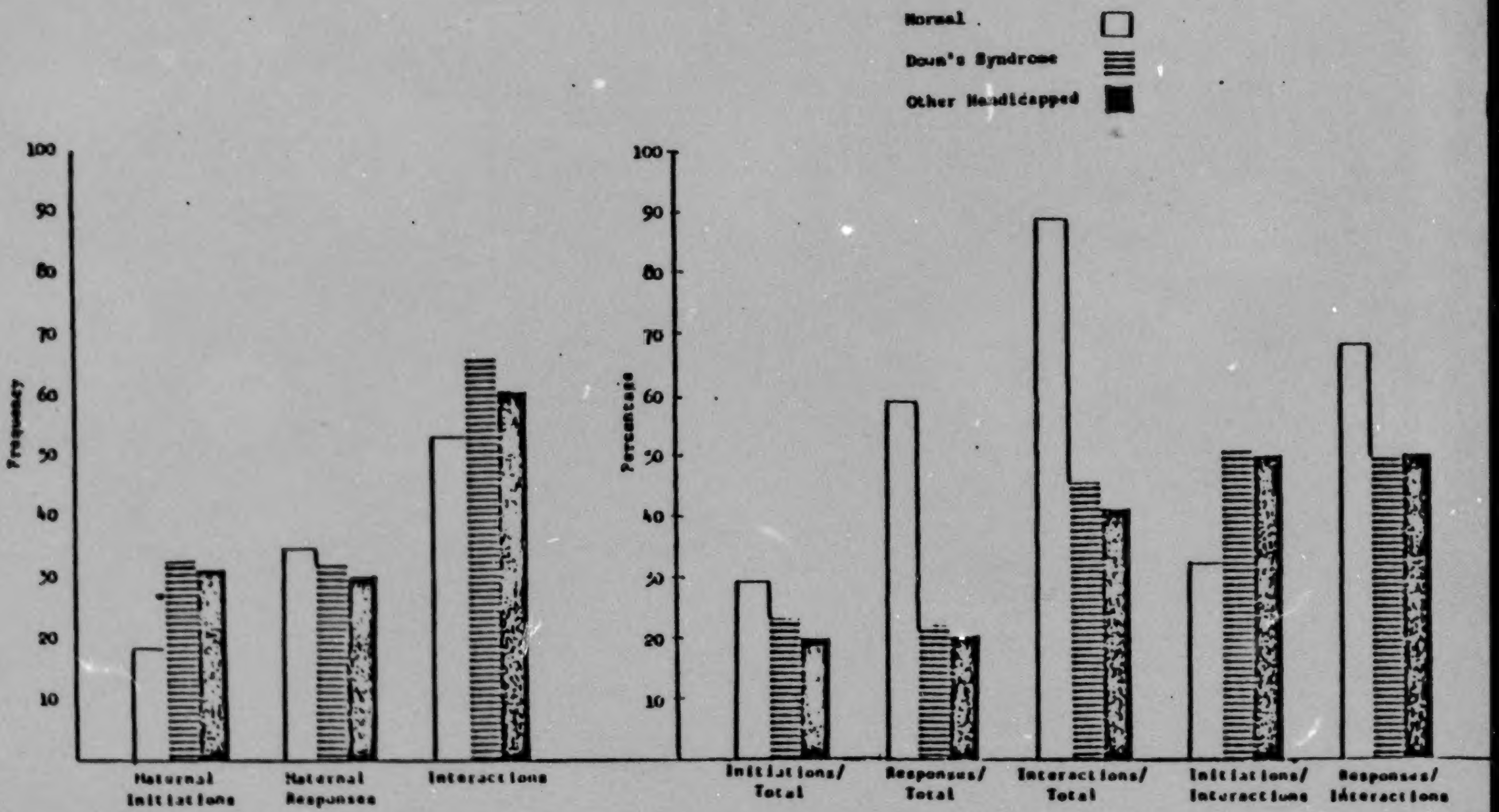


Figure 30 Mother-Infant Complex Interactions at Chronological Age 24 Months for Normal, Down's Syndrome and Other Handicapped.

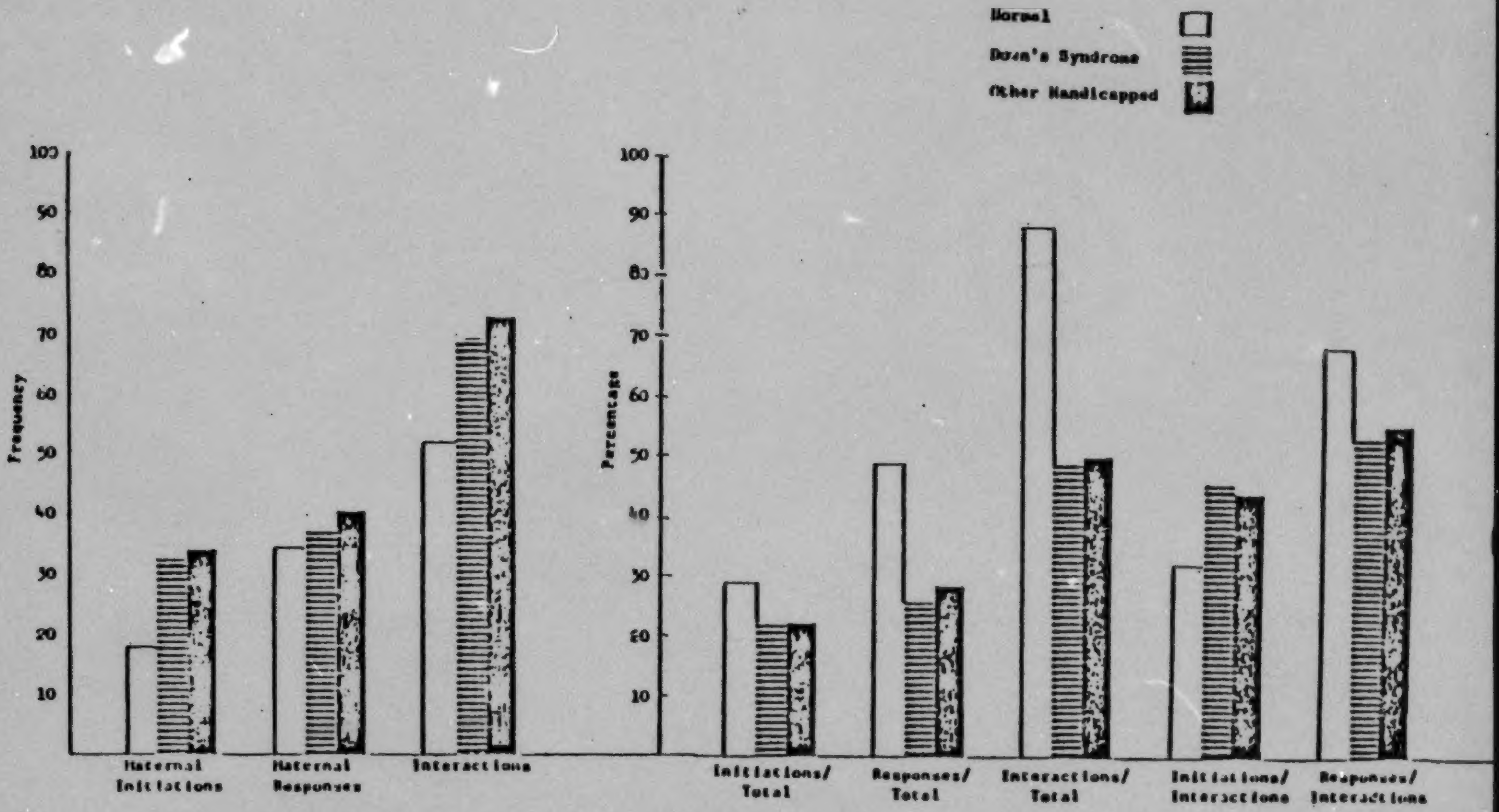


Figure 31. Mother-Infant Complex Interactions at 24 Months for Normal, Down's Syndrome and Other Handicapped--Age Corrected.

Program Use of the Competency Assessment Battery

The Competency Assessment Battery was designed for program use, both in terms of assessment as well as interpretation of the results of the assessment of any individual child. Initially, as the measures themselves were being evaluated and procedures altered to accommodate children with various handicaps, the major form of program use of the Battery involved feedback from the testers. When the Battery was essentially in its final form, a cooperative relationship with the Preschool for the Multiply Handicapped at the Roosevelt Hospital was established. Within this infant program a training procedure was instituted with the goal of total implementation, scoring and interpretation of the Battery to be done by the program personnel. Each of these program uses: feedback and training will be discussed in turn.

A. Feedback to Infant Programs. One of the critical elements of the cooperative relationship we have established with the infant programs we test in has been our commitment to give each program information about the performance of individual children on the CAP Battery. In addition to design and field testing of the CAP Battery, therefore, a major endeavor of the CAP project has been the development of effective ways of giving individual child feedback to the programs. This feedback must be informative, useful in terms of curriculum design, and, most of all, understandable to the professionals working in the programs, many of whom are relatively unfamiliar with the theories and language of psychological research.

A report format for individual-child feedback has been developed for all of the CAP measures. The report format for each measure serves a dual function: (1) to present the critical information about a child's performance on the task; and (2) to give the program staff an understanding of the general purpose and structures of the task. Consequently, the report formats for all of the measures include: (1) a brief discussion of the purpose and structure of the measure; (2) a description of exactly how performance is scored; (3) explanations of possible behavior patterns (with the types of performance) a child might exhibit on the task; and (4) a score sheet. Great care has been taken to design score sheets which summarize the key aspects of a child's performance in a clear, easily understood manner. Two examples of individual child feedback follow.

Sample feedback on two infants. Because of time constraints and the nature of the CAP project, it is not possible to give the infant programs extensive clinical analyses and interpretations of each child's performance on all of the CAP Battery measures. Consequently, presentation of the feedback to program staff involves a brief explanation of the nature and goals of the CAP Battery, a description of the type of information included in our feedback reports and a discussion of the meaning and implication of one sample child's performance on each measure. The score sheets for each child's performance on each measure are given to the program along with several copies of the entire report format for each measure. Interpretation of a child's score sheet is reasonably straightforward in light of the explanations and interpretations provided in these report formats, although questions on individual children are addressed by CAP staff. Presented in this section are two samples of the type of feedback given to centers on individual children.

In addition to the score sheets for performance on the Attention Tasks, Object Permanence Scale, Carey Scale, Mirror Task and Socioemotional Development Scale (for the second child presented), the Bayley Score Sheet and Checklist based upon the Mother Infant Interaction session are also included since these are fairly easy to interpret, even without the aid of a report format.

The first reports are for a 28-month-old Down's Syndrome infant, Ann W. Ann appeared to be motorically intact and was walking. The reports presented here indicate that Ann's development was less delayed than many of the children in our sample, but was still uneven. Like many of the Down's Syndrome children in our sample, Ann's cognitive development was generally more delayed than her social development, but even within the cognitive realm, her competencies were very variable.

The second set of reports are for a 15-month-old infant with cerebral palsy, George P. George was severely handicapped, motorically. His neck and head control was fairly well developed but his legs were quite rigid and he had difficulty grasping and manipulating objects. This latter impairment greatly hindered his performance on the Bayley and Uzgiris-Hunt Scales. However, George's performance on the Attention Tasks also indicates delayed cognitive development. The information included in this section indicates that George's social development was also less advanced than would be expected of a child his age. Incidental observation of George during the program—especially during his mother's absence when he became almost hysterical—supports this impression.

Both sets of reports may be found in Appendix B.

B. Training of Program Personnel in Use of the CAP Battery. During the summer of 1980 the infant program personnel from the Preschool for the Multiply Handicapped at the Roosevelt Hospital were involved in training in use of the Competency Assessment Battery. This training served a dual function: 1) to provide the information necessary for a written instruction manual for administration of the Battery to be developed, and 2) to find out what additional information was needed so that optional use of the testing results was possible within an infant program.

Training proceeded through several steps. First a trained tester verbally reviewed both the purposes of the CAP and the individual measures within it. Preschool personnel were then asked to read the written material on each measure. The written information included a brief description of the measure as well as procedures for administration, scoring, and interpretation. Discussion with the program staff following their reading of this information pointed out where, and in what way, this information was inadequate in terms of actual implementation of the Battery. This system of analysis was carried out with each measure in the battery.

The next step involved staff observation of the actual testing. Staff observed the administration of each measure several times. Questions regarding administration and other testing issues were asked at this time. Some of the issues raised by the staff concerned maximizing use of whatever response systems were available to the child (e.g., visual) while others concerned positioning of physically impaired children so that their range of movement was increased.

After observation, staff practiced the administration of measures with children who had already been tested as subjects in the project. The experimenter observed these practice sessions, correcting and instructing as necessary.

This process provided information regarding: 1) the need for detailed written instructions for each measure and what the content of those instructions should be; 2) testing issues in reference to each measure; 3) scoring of measures, and 4) interpretation of results. This information will be used in the development of the CAP Handbook, an assessment manual resulting from this project. This manual will be discussed in Section VII: Products.

Accomplishments to Date

Thus far, several goals of the CAP Project have been met. They include (as discussed previously):

1) design and development of the Competency Assessment Profile;
2) modification of the CAP Battery;
3) training of research staff to use the assessment instruments which comprise the CAP;
4) establishment of relationships in New York City and New Jersey where this battery could be field tested;
5) field testing of the CAP Battery in handicapped infant stimulation programs;
6) development of scoring systems for each of the CAP instruments;
7) development of individual-child feedback systems for infant programs;
8) development and field testing of curriculum modules based upon the CAP Battery;
9) preparation of a conference on assessment techniques;
10) completion of a second draft of the CAP Handbook;
11) development of a set of assessment instruments for program use;
12) data reduction and data analysis;
13) design of new data analysis;
14) training of program personnel in use of the CAP;
15) presentations at professional conferences;
16) workshop presentations on assessment techniques.
17) completion of data analysis;
18) completion of the CAP Handbook;
19) dissemination of the assessment instruments for program use;

20) publication of a book on The Handicapped Infant;

21) workshop presentations on the CAP;

22) professional meeting research presentations;

23) research paper publications, and

24) data collection on the longitudinal sample.

3. Preschool Longitudinal Study: Competency Assessment Project Follow-up

Rationale

The CAP subjects were seen a second time in order to explore five issues: 1) The relationship between various domains of functioning, in particular the cognitive and emotional domains; 2) Development as an interplay between the child's status and its environment; 3) The issue of continuity and change as it effects the development of handicapped children; 4) Individual and group differences both across and within handicapping conditions; and 5) The relationship between diagnostic classification (etiology) and behavior.

Method

In the fourth and fifth years, children originally seen during the Competency Assessment Project were retested. Because of the tremendous and varied amount of data available on these CAP children, a logical and natural consequence was a longitudinal continuation of this project. This type of research will help to advance the literature available about how the skills of handicapped children increase and change with age.

The specific goals of the Preschool Longitudinal Study are as follows: 1) To see as many of our children from the original study as possible; 2) To learn more about how preschool children function in the areas of perceptual-cognitive, social-emotional, and linguistic development as well as environmental status; 3) To learn more about the process of development in these areas from infancy to preschool or school age; and 4) To provide information which can be used to evaluate the assessment measures which resulted from the Competency Assessment Project.

Judging from the positive reaction of the parents and school personnel involved, there is a definite need for information of this type to be collected, analyzed and disseminated to individuals concerned with the education of handicapped children.

Subjects. Our initial subject list included all the 144 children involved in the Competency Assessment Project. Diagnostic categories were consistent with those used for CAP. The subjects were assigned to categories according to the age at which initial testing (T_1) was done and also as to age as of October, 1981 (beginning of retesting, T_2) (See Table). Those children who were at or near age limits for the three categories of T_2 were contacted first. A group of approximately 15 children who live in the metropolitan New York area were tested during a two-week period at the Institute facilities at St. Luke's-

Table 17

Distribution of subjects according to age
at first testing and second testing

AGE AT SECOND TESTING	AGE AT FIRST TESTING			
	Year I	Year 2	Year 3	Total
2½ - 3½ years	23	5	4	32
4½ - 5½ years	17	32	18	67
6½ - 7½ years	-	12	33	45
				144

Roosevelt Hospital Center in New York City.

Of the original 144 subjects, 105 were retested at the Infant Laboratory or in their homes, 10 had moved out of state but completed all questionnaires, 7 had died, 1 had been institutionalized, and 3 were too old to be retested. Only 18 were unavailable for testing. Thus, the criteria of retesting at least 80% of the sample was met.

Procedure. Our initial task for this follow-up testing was, of course, to reestablish contact with the CAP parents. Letters were sent to the last known addresses. In cases where there was a change of address, we found that the infant programs, which initially served as our sources of participants, had kept in touch with many of the children and were able to provide us with enough information to ultimately locate a large percentage of our original sample.

The letter that was sent to parents explained the exact nature and purpose of the project as well as what would be required of them as participants. Phone calls were then made to arrange convenient testing times. The testing itself was accomplished in a session lasting approximately 2 hours. The parents brought the children to the ETS Infant Laboratory or to St. Luke's-Roosevelt Hospital Center. When it was impossible for parents to bring their children to the Infant Laboratory, arrangements were made for home testing visits by Institute personnel. In cases where the subjects had moved far distances (i.e., out of New Jersey or metropolitan New York) the parents were asked simply to fill out questionnaires which were sent to them.

Before testing began, all the procedures were explained to the mother/parents before any questions which arose were answered.

A testing session consisted of the following (explanation of specific measures follow):

1) A fifteen minute mother-child interaction in a free-play setting,

2) A two minute separation where the mother was asked to leave the room,

3) A five minute reunion and additional free-play,

4) Maternal teaching task,

5) Mirror task (for children with MDI's less than 3 years of age),

6) Object permanence task (for children with MDI's less than 2 years of age),

7) Administration of Home Observation Questionnaire,

8) Standardized intelligence test scale (Bayley, Stanford-Binet, or Stanford-Binet and WPPSI depending on level of cognitive functioning),

9) CAP Language Scale (if the child's mental age is less than 3 years of age).

At the conclusion of the session, mothers were given a packet of questionnaires (See Measures Section) to complete and return to us in the self-addressed, stamped envelope provided. The questionnaires in this packet included: 1) Carey Temperament Scale, 2) Family Environment Scale (Moos), 3) Social Network Inventory, 4) Parent Expectations Questionnaire, 5) Achenbach Child Behavior Profile, 6) Family Life Events Scale, 7) Friendship Questionnaire, and 8) Parent Questionnaire. They were also advised that a written evaluation of the cognitive portion of the testing would be sent to them. Copies of these questionnaires can be found in Appendix E.

Measures. The Preschool Longitudinal Study employs measures which assess the child's functioning in the areas of perceptual-cognitive, social-emotional, and linguistic development as well as environmental status. Several of the measures from the CAP Battery are used as well as others which are more applicable to this older age group. Following is a brief description of each measure used.

Perceptual-Cognitive Development

1) Bayley Scale of Mental Development (Bayley, 1969)
This scale is described under CAP Measurements,

2) Stanford-Binet Intelligence Scale (Form L-M, 1960)

The Stanford-Binet Scale is a widely used measure to assess cognitive functioning from 2 years to adulthood. The Stanford-Binet was the measure found to be most accomodating to the various age and functioning levels of our sample. Sattler (1965) has analyzed the function of this 1960 scale and designated seven major categories of competency: Language, Memory, Reasoning, Conceptual Thinking, Numerical Reasoning, Visual-Motor, and Social Intelligence. The 1960 scale has the subtests arranged according to chronological age levels from age 2 (II) to Superior Adult III. From 2 to 5 years the items (or subtests) are grouped according to half-year levels, such as II, II-6, III, III-6, etc. Between age 5 and 14, the levels proceed on a yearly basis, V, VI, VII, etc. Each age level has six subtests. In addition to the regularly given items at each age level there is an extra subtest designated as an alternate item. A short form of the Stanford-Binet may also be given in which only four items at each age level, rather than the usual six are scored.

As with the Bayley testing during CAP, certain concessions were made with regard to the testing limitations placed on children with handicapping conditions. Questions were repeated more often, additional time was given for children to answer, and alternative forms of communication were permitted, i.e., pointing, gesturing, sign language, and visual (eye) contact in cases of severe motor impairment. Mothers were encouraged to give the examiner any suggestions which might help the child during the session.

Children were scored so that each was assigned a mental age.

3) Wechsler Preschool and Primary Scale of Intelligence (Wechsler, 1967)

The WPPSI which is smaller to the WISC (Wechsler Intelligence Scale for Children) in organization and content, was developed to meet the need for a scale that could be used to measure the intelligence of children of preschool age (4-6½ years). The WPPSI was used in conjunction with the Stanford-Binet for children functioning on the prescribed WPPSI age levels as determined by the Stanford-Binet. Four subtests were used in the Preschool Longitudinal Study: 1) Information which consists of 23 items designed to assess the general knowledge level at which the child functions, 2) Vocabulary which consists of 22 items which assess the child's familiarity with standard English word meanings, 3) Arithmetic which includes 20 items designed to measure basic quantitative concepts both with and without the explicit use of numbers, and 4) Block Design which includes 10 items designed to assess a child's perceptual-motor skills.

4) Development of Visual Pursuit and Permanence of Objects Scale (Uzgiris & Hunt, 1975)

This scale is described under CAP Measures. When children had a mental age of less than 24 months, they were given the Uzgiris-Hunt Scales.

Social-Emotional Development

1) Mother-Child Interaction Scale (Lewis & Lee-Painter, 1974)

This scale is described under CAP Measures. The only modification from the CAP procedure was that separation was for a maximum of 2 rather than 3 minutes.

2) Mother Teaching Task (Match-to-Sample Task - Filler, 1976; Filler & Bricker, 1976)

Mothers were asked to teach their children a match-to-sample task. The task consists of matching four picture blocks to a card which has the identical pictures printed on it, for example, shapes (cross, circle, square, and star). The behaviors coded for the mother are: verbal direction, nonverbal cues (the mother places the block so that the correct solution is suggested, i.e., putting the block next to the correct slot), opportunity (the block is placed equidistant from each slot, thereby providing the child with the opportunity to make the correct response, points (gesturing by the mother to emphasize critical task features), physical guidance and demonstration. Child behaviors are coded into two categories: correct response and incorrect response (the block is placed in the wrong slot or is placed in the correct slot). Categories of mother feedback include: verbal feedback (positive and negative), physical feedback (positive and negative), and rewards. Thus information on the interaction process of teaching is provided.

3) Mirror Task (Brooks-Gunn & Lewis, 1975)

This measure is described in the CAP section. This measure was used when a child's mental age was less than 3 years of age. The final situation (mother puts a mark on her nose and the child's reactions in response to this are noted) was not included for the longitudinal study.

4) Temperamental Scale (Carey, 1970)

The Carey Temperament Scale is described in the CAP section.

Environmental Status

1) Family Environment Scale (Moos, 1974)

The family Environment Scale consists of 90 items divided into 10 subscales of nine items each. The items consist of statements (e.g., "There are a lot of spontaneous discussions in our family") which are indicated as being either "True" or "False" by the respondent. The items and subscales are designed to tap three major dimensions of the family environment: 1) Relationship Dimensions (Cohesion, Expressiveness, Conflict), 2) Personal Growth or Goal Orientation Dimensions (Independence, Achievement Orientation, Intellectural-Cultural Orientation, Active Recreation Orientation, Moral-Religious Emphasis, and 3) System Maintenance and System Change Dimensions (Organization, Control).

2) Social Network Inventory (Lewis & Feiring, 1982)

This questionnaire asks mothers to list all persons with whom her child comes into contact, how often this contact occurs, ages of the persons involved, as well as what the exact relationships are of these persons to the target child (i.e., cousin, babysitter, grandmother, school teacher, psysical therapist, etc.).

3) Parent Expectations Questionnaire (Brooks-Gunn & Wehren, 1982)

This questionnaire is a list of situations that children may be expected to manage at different ages (ages range from 0-1 to 15+ years). The situations include such items as "Be able to wash hands and face", "Do household chores", "Begin to read", etc. The tasks the child has accomplished thus far as well as giving a timetable for what the parents expect him/her tc accomplish in the future are assessed.

4) Achenbach Child Behavior Profile (Achenbach, 1978)

The Achenbach Child Behavior Profile is designed to measure the social competence of the child together with the extent of behavior problems that the child might have. The original scale has been somewhat modified for use with this handicapped sample. For example, the parent is asked to list the child's favorite physical activities as opposed to asking about sports in which the child is involved. The social competence portion also asks about favorite hobbies and games; organizations, clubs, or groups the child belongs to; any jobs or chores the child has; the number of close friends the child has and how much weekly contact he has with them; how well the child gets along with brothers and sisters; other children, parents; how well he/she plays and works alone. Sections about specific academic school performance (Reading, Math, Spelling, etc.) have been eliminated and replaced with one question as to whether the child is in a special education class. The Behavior Problems section consists of 100 items grouped into nine subscales: 1) Depressed, 2) Social Withdrawal,3) Somatic Complaints, 4) Schizoid Obsessive, 5) Hyperactive, 6) Sex Problems (for females); Uncommunicative (for males), 7) Delinquency, 8) Aggressive, and 9) Cruel. Scales 1 through 4 are designated as "Internalizing," while scales 5 through 9 are designated "Externalizing".

5) Family Life Events Scale (Lewis & Feiring, 1982)

This questionnaire asks mothers to list stressful events particularly significant to the target child that may have taken place over the last two years, i.e., change in parental occupation, serious illness, accidents, deaths, unfortunate events, changes in marital status of parents, moves the family may have had to make. Child's age at time of stressful event, child's reaction to the event, type of stress, and general effect of stressful event on family are all noted.

6) Friendship Questionnaire

This questionnaire focuses on information about the child's playmates and friends, and activities both at home and at school.

7) Parent Questionnaire

This questionnaire includes general background questions about the child's developmental history, family composition, handicapping condition, etc. The mother is also asked several questions about programs the child has been enrolled in since birth including infant programs, preschool programs, and elementary school programs. A section concerned with the last complete clinical evaluation of the child's status is also included. Finally, the mother is asked about certain aspects of the child's social development -- response to strangers and to separation from the mother, as well as early language development milestones.

8) Home Observation Questionnaire (Brooks-Gunn & Wehren, 1982)

This questionnaire is administered to the mother at some time during the testing session. It asks questions pertaining to the child and his/her everyday activities at home. For example, what types of toys the child has, is he/she learning about colors, shapes, etc., what TV programs does the child watch, how do the mother and father respond to misbehavior as well as to the accomplishments of the child. This questionnaire is a modification of the Caldwell Scale.

9) Examiner Rating Scale (Institute for the Study of Exceptional Children, 1982)

The Examiner Rating Scales are designed to record the examiner's impression of various aspects of the child's (and in two cases his parent's) behavior during the Laboratory visit testing situation. The following areas are scored: 1) child's object orientation, attentiveness, and curiosity, 2) child's goal directedness, 3) child's attention span, 4) child's activity level, 5) child's responsiveness to examiner, 6) child's cooperativeness, 7) child's fearfulness of testing, 8) child's performance anxiety, 9) child's general emotional tone, 10) examiner's impression of parents in regard to degree of comfort and need to impress the examiner during testing session, and 11) examiner's impression of parent's warmth.

Linguistic Development

1) CAP Receptive-Expressive Emergent Language Scale (adapted from Bzoch & League, 1970-71)

This scale is described under CAP Measures.

Data Collection and Analysis

Data collection was completed during the middle of June. Preliminary data coding and analysis has begun.

4. Premature Infant Followup Project

Overview

The purpose of the Premature Infant Followup Project is to provide information on the social, emotional, and cognitive competencies of a group of 12- and 18-month-old children that are at risk due to premature birth.

The child observed were involved in a study conducted at Babies Hospital, Columbia-Presbyterian Medical Center, New York, New York. The goal of that study was to follow infants surviving respiratory distress (RDS) and a group of premature controls to determine the neurologic and behavioral outcome of these birth conditions. Data collected on these children by hospital staff include neurological examination results at 6, 12, 18, and 24 months, and Bayley Infant Development Test scores at 12 months.

The Premature Infant Followup Project was designed to supplement the medical and general intelligence measures collected on the Children at Babies Hospital. In keeping with the aims of the Detection Unit, we are interested in assessing specific competencies in perceptual-cognitive, social-emotional, and infant characteristic development. When taken in conjunction with the medical and neurological data already available, information from these additional three domains of infant functioning will allow us to better identify and predict the developmental outcomes of prematurity.

A description of the Premature Infant Followup Project is presented below. As most of the measures used are those of the Identification and Competency Assessment Projects, the reader is referred to the relevant sections of the current Research Plan for a full account of the rationale and objectives of the methods employed.

Study Description

The subject population was not homogeneous. Although all of the children were born prematurely, some were of extremely low birth weight while others were of more normal birth weight. In addition, one-half of the children suffered respiratory distress at birth. One goal of the present research is to examine each category of premature infants in terms of their relative mental and social competencies. In this way, we hope to be better able to predict potential dysfunction within the at risk population of low birth weight infants.

We assessed the infant at 12 and 18 months of age (N's range from 45 to 60). These ages were selected both to maximize the number of infants of a given age available during the period of the study and to take advantage of already-scheduled visits to the hospital.

Assessment at 12 months. Two types of infant characteristics were measured at 12 months: infant temperament and intellectual functioning. Infant temperament involves the behavioral style of the infant in terms of such factors as persistence, reactivity, and adaptability. Individual differences in behavioral style factors seem crucial to assess since they affect others' perceptions and interactions with infants, and thus, in part determine the quality of the infant's social environment.

Temperament was assessed using the CAP modification of the Carey Scale. The questionnaire was mailed to mothers prior to their 12-month visit and/or given to mothers during their visit. We obtained temperament data on about 60 12-month-old infants during the period of the study.

Intellectual functioning was assessed using the Bayley Scales of Infant Development. The Bayley Scales are the most widely used and rigorously constructed of the American infant intelligence scales. All infants enrolled in the Babies Hospital project were administered the Bayley Scales at 12 months.

Although performance on the Bayley Mental Development Scale is typically expressed as a single, overall score, recent research suggests that it may be more informative to use factor analysis in analyzing test results. For example, we have examined the factor structure of the Bayley MDI score for a large group of 3-, 12-, and 24-month-old normal infants; for the 24-month-olds, for example, we have found three discrete factors: manipulation, object awareness, and social awareness. Children were found to do better on one factor versus another though these differences may not have been reflected in overall MDI scores.

Assessment at 18 months. The second part of the Premature Infant Followup Project concerns assessing infant abilities at 18 months of age (45 infants were seen).

A variety of measures were collected at 18 months. These will be used to form profiles of the infant's skills in three interrelated domains: (1) The Socio-emotional Domain -- including infant temperament, knowledge of self, and emotional reactions to both unfamiliar adults and the mother or primary caregiver; (2) The Domain of Linguistic and Communication Competence — including early language comprehension and production skills and knowledge of others' perspectives; and (3) The Perceptual-Cognitive Domain — including attention and habituation to social and nonsocial stimuli.

Our goal in collecting these measures is to identify patterns of emotional, linguistic, and information-processing behavior that both differentiate subgroups within the premature population and lead to the designation of being at risk when compared to normals. The methods that are used to assess competence in each domain are:

(1) Socio-emotional Competence.

(a) Temperament. During their 18-month visit, mothers were asked to complete the modified Carey Temperament Scale.

(b) Knowledge of Self. The Mirror Test of Self-Recognition is used to assess the infant's knowledge of the self. We believe that knowledge of the self is a critical milestone in development, playing an important role in further social and emotional development. The Mirror Test involves recording, using a behavioral checklist, the infant's response to seeing him/herself in a large mirror in four conditions. In one condition, for example, a small mark of color is surreptitiously placed on the infant's face. The observer then records if the infant notices this mark or not, and the infant's reaction if the mark is noticed.

(c) Emotional Expression. Socio-emotional Scales are used to measure the infant's emotional expression in 12 situations, e.g., being approached by an unfamiliar adult (the experimenter), the mother leaving the room for a moment, and the mother returning to the room. The format of the socio-emotional scales is an observational checklist. Behaviors representative of a given emotion are recorded and then scaled to determine the relative intensity of that emotion. The scales used in the Premature Infant Followup Project include fear, happiness, competence, attachment, and attachment-stress.

(d) Mother-Infant Interaction. Mother-infant interaction is measured using a behavioral checklist. Seven characteristics are observed: mother and child affect, maternal teaching style, mothers' comforting behavior, mutual attentiveness of mother and child, the responsivity of mother and child when interaction is initiated, mode of stimulation (e.g., tactile, visual, verbal, and so on), and finally, the child's state during the observation. Observations are repeated five times during the session: when the child is approached by the stranger, during mother-child toy play, during the mirror task, during the attention task, and during reunion, when the mother returns after leaving the room.

(2) Early Linguistic and Communication Competence.

(a) Comprehension and Production of Language. Early abilities to comprehend and produce language are assessed using a modification of the Peabody Picture Vocabulary Test. This test assesses language comprehension and production by having the child label and identify pictures of common objects. In scoring the child's performance on this task, we have included categories of looking and pointing at the card on which the pictured object appears (without identifying the object), and of vocalizing without full articulation of the object name. In this way, we give the child credit for knowing what the task calls for, even if he/she is not able to name or identify the appropriate objects.

(b) Knowledge of Others' Perspective. An essential part of the ability to communicate is the ability to overcome egocentrism and take into account another person's perspective. We use the Show Card Pictures task to assess the child's perspective-taking ability. In this task, the child is given pictures of common objects and asked to show the picture to his/her mother. Ability to take another's perspective is gauged by the extent to which the child will turn the face of the picture toward the mother.

(3) Perceptual-Cognitive Competence. Visual attention to social and nonsocial stimuli are used to assess the child's information-processing abilities. Two measures of attention were used. The first is habituation to a redundant stimulus and the second is recovery to a novel stimulus. Together, these measures have proved predictive of later intellectual functioning. Moreover, a large amount of data on attentional response patterns of both normal and other at risk populations is available for comparison with data obtained on the present population. As with our other measures, between-group comparisons can also be made for the subgroups in the present study.

Duration of visual fixation on the stimuli will be the primary measure of habituation and recovery. Both nonsocial stimuli (e.g., geometric forms) and social stimuli (e.g., pictures of adults) were employed. Both social and nonsocial stimuli were included since infants' responses to the social and nonsocial world are often quite different. This distinction may be very important for children identified as at risk.

Assessment of socio-emotional competence and language ability took place during the infant's regularly scheduled 18-month visit to the hospital prior to the neurological examination. Observations were made in a playroom setting by observers trained in the use of the behavioral checklists.

Accomplishments to Date

Several goals of the Premature Infant Followup Project have been met and include:

(1) construction of laboratory at Columbia Presbyterian Hospital;

(2) training of observers;

(3) data collection;

(4) data coding;

(5) data analysis, and

(6) preparation of articles.

B. RESEARCH UNIT

Need for Research

The importance of an intense and extensive research effort on the development of handicapped and at risk infants cannot be overemphasized. While the past decade has witnessed an explosion of research on normal infant development, there has not been a comparable movement in the study of at risk and handicapped populations. The research which has been done to date has treated only the most obvious issues, e.g., the intellectual development of infants diagnosed as handicapped or at risk due to birth trauma, and has not generated new research methodology based on the general needs and development of handicapped infants. The purpose of the Research Unit of the Institute is to gather information on normal, handicapped and at risk infant populations which can be used in the development of detection and intervention techniques. We believe that research is both necessary for and an integral part of detection and intervention. The following three points speak to this necessity—(1) the inadequacy of current detection measures, (2) the inadequacy of current intervention strategies, and (3) the way research has contributed to the development of better assessment tools.

Current detection strategies are inadequate for several reasons. First, some of the most widely used detection measures yield nothing more than a description of the child's general level of functioning—usually represented by a single age-equivalent score or an intelligence quotient. Used in the standard, prescribed manner, these measures give no information about the nature of the child's deficit—his specific strengths and weaknesses—and therefore are of limited use in designing curricula. Second, many detection measures focus on developmental milestones. The Alpern Boll Developmental Profile, the Vineland Social Maturity Scale, and the Marshalltown Behavioral Developmental Profile are three commonly used detection instruments which are milestone-based. The major problem with this type of tool is that a child's developmental deficit cannot be picked up until he has very definitely missed a major milestone, resulting in relatively late detection and intervention. Third, another problem with detection lies in the predictive power of current assessment tools. The underlying assumption in assessment, intervention, and evaluation studies is that intellectual performance at one point predicts intellectual performance at a later point. Research has shown that few (if any) of these tools are particularly accurate predictors of the child's later functioning (Bayley, 1969; Honzik, 1976). Although prediction is better in severely impaired than in normal or less severely impaired populations, it is still not high. Fourth, the interaction of the different areas of development is ignored by most current detection methods. An early cognitive delay, whether or not it directly translates into a later comparable delay, must also affect other areas of the child's functioning, e.g., his social interaction patterns and his motivational systems. To date, however, no data exist on the relationships of skills being measured by detection instruments or of these skills to other skills.

Current intervention strategies for handicapped and at risk infants are also inadequate. First, like many of the detection instruments, a large number of early intervention curricula are based strictly upon gross milestone achievement. For example, the Portage Guide to Early Education and the Marshalltown program, widely used curricula in infant stimulation programs, consist of checklists of major milestones, with specific activities which might lead to their achievement. Second, most curricula focus on certain skill areas to the exclusion of others. Almost all infant programs work on motor and cognitive development, while fewer programs give more than casual attention to social-emotional development or to the intricate relationship between social development and cognitive progress. Third, most intervention programs rely upon inadequate assessment of current strengths and weaknesses in various skill areas. The milestone and single score detection instruments simply do not provide a broad and individualized picture of the child's abilities and deficits. Yet, without this picture it is difficult to determine where intervention is needed and what the best approach to a particular child might be.

Not only can the need for research be demonstrated, but an examination of the major infant assessment techniques reveals that research has, in fact, been an integral part of the development of those measures. Research enters into the evolution of an assessment tool in one of two ways. First, a research paradigm designed to gather normative data may be adapted to collect such data on deviant development. Second, a clinical tool may be developed and then validated through research on normal and deviant infant populations. For example, the first paradigm was used by Lewis (1969, 1975) who first developed a measure of attention and information processing, and later used this measure to study attentional deficiencies in at risk populations (Lewis, 1971; Zarin-Ackerman et al., 1975; Yoshida et al., 1974). The second paradigm was used by Brazelton (Neonatal Behavioral Assessment Scale) who first developed a clinical assessment scale, then refined the scale through the use of normal populations, and finally used the scale to detect differences between at risk and normal populations (Brazelton, 1973). Both methodologies are essential in any research effort.

Purpose of Research Unit

The Research Unit is comprised of three Projects — the Contingency Research Project, the Pilot Research Project, and the Infant Attention Project.

The Contingency Research Project involves finding out more about infants' use of contingency in learning, via systematic study of normal and handicapped infants. This is necessary in order to facilitate infant skill training in the Contingency Intervention Project. Specific aims include:

(1) examining the kinds of response reinforcers that are most effective;

(2) identifying developmental changes in contingent responses;

(3) examining the relationship between infant responses and response reinforcers;

(4) examining affective and state changes as a result of contingency experience;

(5) examining the facilitation and generalizability of contingency experience to other situations, behaviors and competencies;

(6) compare patterns of learning of normal versus handicapped infants.

The Pilot Research Project involves conducting pilot research on social-emotional, perceptual-cognitive, and communicative-linguistic development in handicapped infants. These pilot research studies will eventually form the basis for designing larger scale research studies. Specific aims include:

(1) designing research studies on handicapped infants' social-emotional, perceptual-cognitive, and communicative-linguistic development;

(2) conducting pilot research in these areas;

(3) comparing the results of the pilot research with handicapped infants to normal development;

(4) using this information from the pilot research studies to design large scale research studies.

The Infant Attention Project involves an in-depth look at various methodologies for assessing infant attention, developmental changes in attention, and the prediction of cognitive functioning from early attention. Specific aims include:

(1) studying the developmental course of performance on habituation tasks;

(2) assessing the reliability of habituation tasks;

(3) examining the sensitivity of habituation tasks as a predictor of later cognitive abilities:

(4) examining the relationship between attention and intellectual handicap.

1. The Contingency Research Project

Overview and Rationale

The Contingency Research Project sought to lay the empirical foundations for the development of a contingency intervention curriculum. One of the goals of the Institute was the development of early intervention strategies based in part on the principle of generalized expectancy (Lewis & Goldberg, 1969). Toward this end, the contingency research project explored some of the basic research questions that preceeded any implementation of intervention plans.

Learning to Learn

One of the primary constructs around which a great part of the Institute program revolves is the concept of generalized expectancy--learning to learn. First articulated by Lewis and Goldberg (1969), learning to learn essentially may be defined as the acquisition of competence to interact in the world and to control one's environment. Such competence develops over time as the result of various contingency experiences. Similar to Piaget's (1947) notion of circular reactions, contingency experiences may be defined as "if-then" relationships. For example, if the infant moves its hand, pulling on a string, then a mobile in its view revolves. The extent of hand pulling relates to the type of consequence involved. The ease with which this relation is learned depends on the effort involved in producing the consequence (Rovee-Collier & Gekoski, 1979).

Thus, the linkages of specific behavioral responses to contingent outcomes increases with time and the success of these links become the basis for generalized learning, competence, motivation and a sense of self in relation to the world. In a sense, an infant's experience and mastery at discrete contingency experiences may generalize in action and motive towards other behaviors. For example, the successful contingent relationship an infant may develop with its mother may facilitate a sense of mastery over the enviornment, thus encouraging exploration and further learning. Alternatively, a child who has not had these successes--is unable to experience these contingencies--may not develop the sense of masterv so crucial toward any mastery of the environment and in a sense learns instead to be helpless (Roth, 1980; Seligman, 1975).

The research literature to date has explored the possibilities of operant conditioning with infants using a number of infant behaviors as responses and a number of consequences as reinforcers, both social and non-social (Finkelstein & Ramey, 1977). This research has demonstrated the saliency of contingencies in infancy. Thus, for example, Watson (1969) demonstrated that young infants will turn their head to press a pillow in order to move a mobile hanging over their heads or light up an umbrella in their visual field. Hillman and Bruner (1972) compared infant responses under two types of contingencies. Finally, Rovee and Rovee (1969) demonstrated that conjugate reinforcement from a mobile could increase leg movements. Thus, there have been a number of studies that have examined the relation of different contingencies to different responses, though the scope of possible relations has certainly not been covered. Additionally, little work with developmentally delayed or handicapped infants has been done. We know little about the ability of these infants to discriminate different contingencies, remember contingencies or the relative effect of these contingencies on subsequent behavior. Finally, we do not know which responses are most accessible and most easily linked in the handicapped population.

The research literature on contingency generalization--learning to learn--is relatively recent and not extensive. Basically two research efforts have investigated this relationship. Rovee and Fagan (1976) attempted to determine the course of daily acquisition and retention of operant footkicks for a visual conjugate reinforcer over four successive 24 hour periods. Their results indicated that "not only can infants retain a stimulus response interaction over a 24 hour period but also their efficiency in doing so gradually improves with continued reinforced practice" (Rovee and Fagan, 1976). Thus the authors suggest that the more contingency experience that an infant has, the better the infant retains that contingency as useful for operating on the environment. Subsequent work by Rovee-Collier and colleagues has focused on infant memory for contingencies and reactions to alterations in reinforcers. While not directly concerned with contingency generalization in young infants, they have established several important findings which bear indirectly on this issue. First and most importantly, young infants remember contingencies over intervals which are quite lengthy, given the brevity of original contingency exposure (Sullivan, Rovee-Collier & Tynes, 1979) and this memory can be facilitated as much as a month after the original experience by simply reexposing the infants to the original contingency context (Rovee-Collier, Sullivan, Enright, Fagen & Lucas, 1980; Sullivan, 1982). The significance of this result is that despite apparent forgetting, the contingency does not have to be relearned. Rather infants can be "reminded" for long periods of time after original contingency experience by showing them appropriate cues. Early contingency learning, once achieved, is a surprisingly enduring experience. The question of its generalizability to novel but similar situations has been more directly assessed in a series of studies that contrasted familiar and novel mobiles as reinforcers after initial contingency experience. Rovee & Fagan (1976) reported that infant response to a novel mobile reinforcer , 24 hours after initial contingency experience, was dramatic. Infants initially inhibited their activity and stared, virtually motionless, at the novel reinforcer. Although there were individual differences in the length of this "study time", infants uniformly returned to their previous response levels after this initial period. Rovee & Fagen concluded that infants not only detect the change in the contingency consequence, but that they transfer their previous knowledge to the novel situation. They do not need to relearn to kick the novel mobile; they simply resume doing so after assimilating its novelty. Moreover, the amount of "study time" was directly related to the number of novel objects on the new mobile. The greater the number of novel components (the more novel/less familiar), the greater the degree of response suppression (Fagen, Rovee & Kaplan, 1976). Thus, generalization occurred more quickly the more similar the new reinforcing consequence was to the original contingency experience. In a subsequent study, the suppression effect to the novel mobiles was found to persist for at least 3 days after initial contingency experience (Rovee-Collier & Sullivan, 1980). Four days after learning the contingency, however, infants failed to detect the novel mobile. That is, infants maintained their original learning level without the "study" effect. Rovee-Collier & Sullivan (1980) concluded that after this interval the specific visual details of the consequence were no longer recalled by the infants and that the excellent response to the contingency at this interval represented a generalized response to any mobile. Thus, the work of Rovee-Collier and her associates provides several insights into the timing of any contingency intervention which hopes to maximize generalization. Their work suggests that contingency experience transfers most easily when the interval between similar contingency problems is within four days and when the novel consequence is most similar to that of the original contingency context.

The second research effort directed toward contingency generalization deals with inter-problem effects. Finkelstein and Ramey (1977) demonstrated that learning of one contingency facilitated later contingency learning employing a different second contingency. In a series of three experiments the authors found that "infants who received prior contingent stimulation appeared to become more competent and efficient learners in new situations". This study seems the closest to verifying the learning to learn model, which postulates improved performance on novel contingency problems given prior history of contingency experience. Obviously though, more extensive research must be undertaken before we can apply the generalized expectancy model to any intervention program.

Contingency Experience as it Relates to Affect and State

Lewis (1977; Lewis and Goldberg, 1969) has discussed the relationships between competence motivation and contingency experience. Their argument is that competence in infancy is, in essence, directly related to the degree of positive affect exhibited by the infant. In their study, infants who exhibited more positive affect were those who had experienced greater contingency learning with their mothers. Most importantly, these infants paid more attention in a visual attention task and habituated more rapidly to a redundant stimulus. Thus, not only does contingency experience generalize across different learning situations, but it also may generate state and affective changes in the infant. These affective changes may in turn be the basis for the infant's developing competence motivation and mastery of the environment. (See the Contingency Intervention Project for a more extensive discussion of competence motivation.)

Indirect evidence of the relationship between contingency experience and affective change already exists in the literature. Watson (1972) and Watson and Ramey (1972) found that infants increased the frequency of their cooing and smiling during contingency periods. Both studies conclude that this pattern of behavior was not the result of the specific contingency employed but rather a result of the contingency experience. Sullivan, Rovee-Collier & Tynes (1979) subsequently confirmed that the rate of smiling and cooing did increase over daily sessions. Within session changes in cooing were idiosyncratic, however, and consistently related to the transition from contingency experience to noncontingency experience at the end of the session (i.e., extinction). It may be that the major consequence is an affective change with infants who have experienced positive social or nonsocial contingent reinforcement exhibiting more positive social/affective behaviors in general. There is already some evidence to suggest that affective reactions to particular contingencies and alterations in contingencies do in fact persist over time (Mast, Fagen, Rovee-Collier & Sullivan, 1980). That they may generalize as well to new situations is not unlikely. Thus, our purpose is to examine the possibility of important affective changes in the infant which may be the result of contingency experience. Such an outcome, even without other effects, would be a positive outcome. An infant's positive affective state would obviously enhance interactions with its caretakers.

Identification of Infant Responses and Response Reinforcers

The majority of the work on infant conditioning has attempted to find responses which may be shaped in the young infant. These studies have used a number of various reinforcing stimuli to condition the infant and have examined various infant responses from eye blink to head turning.

Sucking, a reflex which is present at birth and is under the control of the neonate, has been frequently used for such conditioning studies. Sameroff (1968) successfully conditioned five-day-old infants in a nutritive feedback sucking paradigm. Siqueland and DeLucia (1969) conditioned high amplitude sucking using visual feedback as a reinforcer. Hillman and Bruner (1972) varied the schedule of reinforcement in a sucking paradigm and like Siqueland (1968) found that intermittent reinforcement resulted in greater responding during extinction than the continuous reinforcement conditions.

Head turning has also been a favored infant response. Caron et al., (1971) examined the effect of visual reinforcement on head turning. Others (Clifton et al., 1972) demonstrated the relation between infant state and the conditionability of head turning. In two studies, Watson (Watson, 1972; Watson & Ramey, 1972) found that infants could be conditioned to head turn in order to move a mobile hanging in front of them.

Other behaviors such as footkicks (Fagen & Rovee, 1976; Rovee & Rovee, 1969; McKirdy & Rovee, 1978; Rovee & Fagen, 1976), lever press (Weisberg, 1969) and arm movements (Watson, 1972) have all been found to be conditionable in the young infant. For each, various reinforcers have been used successfully. They vary from auditory and visual feedback to social reward (smiling and vocalization). A number of studies have conditioned social responses in the young infant. Weisberg (1963) using social and non-social outcomes, conditioned vocalization. Tomlinson-Keasey (1972) was able to condition vowel and consonant sounds in young infants. Wiegerink et al. (1974) used social reinforcers and were able to condition vocalization in a group of severely delayed infants. Smiling, another social infant response, has also been successfully conditioned in young infants (Etzel & Gewirtz, 1967; Wahler, 1967; Zelazo, 1971).

Basically, these studies have determined that particular responses can be conditioned. Few studies have investigated which outcomes are more effective for increasing the frequency of a response; nor have studies compared the efficacy of a particular reinforcer (e.g., visual stimulation) across a number of infant responses. It is imperative that we choose those response-outcome pairs that are most likely to increase contingent responding in handicapped children since these children may not have a large repertoire of responses nor may the child be capable of discriminating a large variety of outcomes.

Thus, in conjunction with the Contingency Intervention Project, basic research into the empirical issues surrounding the learning to learn concept was necessary. Specifically, the Contingency Research Project addressed four empirical issues related to the theoretical notion of generalized expectancy or learning to learn. The first of these issues involves the relation of responses to outcomes: specifically what outcomes or contingent events are most facilitative of increased infant responding. The second research problem dealt with the notion of generalized expectancy. Essentially, we wanted to know if experience with one set of contingencies enhances the probability of success in similar learning tasks, and if such experience enhances possible generalization of learning to other less related competencies of infant behaviors. The third research question involved the basic notion of generalized expectancy in terms of motivational changes rather than learning changes. Motivation may be enhanced through contingency experience, with changes in motivation empirically validated by chronicaling infant affective or state changes that may be the result of contingency learning. The fourth issue has to do with age-related changes in affective responses to contingency and the actual learning of a contingency relationship. In sum, the Contingency Research Project's objective was to lay the empirical foundation for the Contingency Intervention Project.

Six investigations were conducted to explore various aspects of each of the foregoing issues. A description of each of the studies follows with a discussion of the results. Finally, the implications of our investigations with regard to the original research questions are set forth.

Study 1: Contingency Learning in 10-Week-Old Infants

Rationale

The first study specifically addressed two issues: first, whether or not 10-week-old infants are able to learn in a contingency setting, and second, whether or not contingency experience results in an enhancement of affect and arousal. The first question is of interest since most of the studies mentioned in our previous reviews are not studying infants as young as 10 weeks with the exception of the studies using sucking as a response. More recently, Rovee-Collier and Fagen (1981) reported that infants as young as 8 weeks can learn a mobile conjugate contingency, although not as efficiently as older subjects. The issue of when infants may acquire contingency knowledge was raised by Sameroff (1968) a decade ago. It is especially important in determining when contingent experience first will be relevant for handicapped populations. The second question involves the relationship between competence motivation and contingency experience. The major consequence of contingency experience may be affective change, even in the absence of demonstrated learning. Zajonc (1979) has recently argued and presented data on subthreshold discrimination. Thus, one purpose of this study is to examine infant affective changes during contingency experience.

Method

Subjects. All subjects were 10 weeks of age (± 1 week). Since the design is a matched pair one (see below), 19 pairs of infants were seen with 9 pairs being female and 10 pairs being male. All infants were healthy, Caucasian, and lower middle to upper middle class.

Conditions. Infants were randomly assigned to one of two groups. Group A (contingent) received a 1-minute base with no stimuli and a variable time contingency trial in which every arm pull results in the stimuli being presented. The contingency trial continues until one of the following criteria are met: 30 seconds of fussy behavior or 30 seconds of eyes closed after the first five arm pulls. Group B infants (Yoked Condition) also received a 1-minute base period with no stimuli and a variable time yoked period. The arm pull responses from one of the Group A infants is used to control the stimuli and the length of the trial. If Group B infants cry or close their eyes for 30 seconds before the trial length (as determined by the Group A infant), the trial is terminated early.

Procedure. Infants were placed in an infant seat within a uniformly colored enclosure, approximately one meter from a screen and speaker with the mother seated behind the infant. A piece of velcro, attached to a pull string was fastened to the infant's right wrist. The slack was adjusted so that movement of the arm (but not solely the wrist) would engage a Schmidt trigger. According to the condition, an arm pull did (contingent) or did not (non-contingent) control the onset of visual and auditory stimuli.

A particularly notable feature of our procedure is that a fixed length session, so typical of learning research in infancy, was NOT employed. Rather, infants were permitted to remain in the session as long as they continued to respond. Thus, infants also controlled the length of their exposure to the contingency, permitting us another measure of their task involvement.

Stimuli. The visual stimulus was a 35mm colored slide of a smiling baby. Only the head and upper torso were protrayed. The auditory stimulus was the Sesame Street theme, being sung by children. Both stimuli were presented simultaneously for 3 seconds per presentation.

Measures. Affect, fixation, and state measures were coded live by means of a standard button box device. The affect measures include smiles, positive vocalization, and negative vocalization; the fixation measures include length of fixation and number of looks. Interobserver reliabilities for the measures were above .85.

Results

The data from this study were examined in two ways. Initial analyses compared arm-pull rates and proportion of time smiling, vocalizing and fixating on the stimulus between the contingent and yoked noncontingent groups (unmatched data). Then, each experimental subject's measures (rates and proportions) were calculated only for the period of time that overlapped with the voked subject's (matched data).

Analyses of the unmatched data from these subjects by dependent t-tests showed that contingent subjects significantly increased their arm-pull rates from baseline to experiment ($p < .02$), while voked subjects did not. T-tests yielded no differences between contingent and yoked baseline arm-pull rates, so the two groups were matched in terms of baseline activity. Contingent subjects tended to smile more than yoked subjects ($p < .10$), and stayed in the procedure longer than yoked subjects ($p < .01$). No differences were found between total contingent and yoked arm-pull rates during the experiment either before or after matching. However, the peak response rate (minute of greatest response) of contingent subjects was significantly above baseline, whereas peak rate of yoked subjects was not ($p < .01$). The most prominent feature of both groups was a decline in activity by the ninth minute, suggesting habituation or fatigue over the course of contingency experience.

Figure 32 presents the mean amount of arm pulls (by 1-minute periods) for the contingent and yoked subjects. As can be seen, the two groups differ in their response rates during the middle of the study (minutes 5 to 12). Before minute 5, no differences are seen and after minute 12, all infants tended to habituate to the stimuli or the procedure and tended to become fussy and inattentive. When looking at the male and female pairs separately (see Figures 33 and 34), it is obvious that the female contingent and yoked subjects differed more than the male pairs. When the total time spent in the experiment is considered rather than a minute-by-minute analysis, only the females exhibited a significant difference in arm pull rates. Thus, learning (as inferred by differences between contingent and yoked subjects' arm pulling rates) was more pronounced in the female subjects. However, when one considers that contingent subjects of both sexes exhibited their greatest and most consistent elevations in response rate long after yoked subjects have ceased to respond, it is apparent that the initial lack of differentiation observed among contingent and noncontingent subjects may have been attributable to increased arousal due to the sudden onsets of the consequence in both groups. For yoked subjects, for whom onsets were uncorrelated with behavior and therefore unpredictable, this arousal may have proved insurmountable, causing them to "fuss" and terminate the session, usually by the 15th minute. Contingent subjects, on the other hand, perhaps because they were dimly aware of a correspondence between their behavior and the consequence, were better able to modulate their arousal and so persisted in the session and attained peak rates significantly above baseline late in the session. Additional support for this interpretation was suggested by our criterion analysis.

Minute-by-minute running means for arm pull rates were calculated for both groups during the time that both were in the experiment. The minute at which the arm pull rate increases 20%, 30% or 40% (depending on the analysis) over the mean of the first three minutes (an increase measure) is identified as well as the number of minutes in which this occurs (a stability measure). Results of these analyses showed that most of the increases occurred in the first 10 minutes of the experiment. The criterion measure was not useful in differentiating between experimental and control groups. There were nearly equal occurrences of reaching the criterion in both groups. This indicated that the yoked subjects, exposed to the results of the contingent subjects' increased arm-pulling, became aroused and, in turn, increased their arm-pull activity.

This suggestion that differences in the modulation of arousal may influence learning at this age increased our interest in the affective and arousal changes associated with contingency experience. We had anticipated that

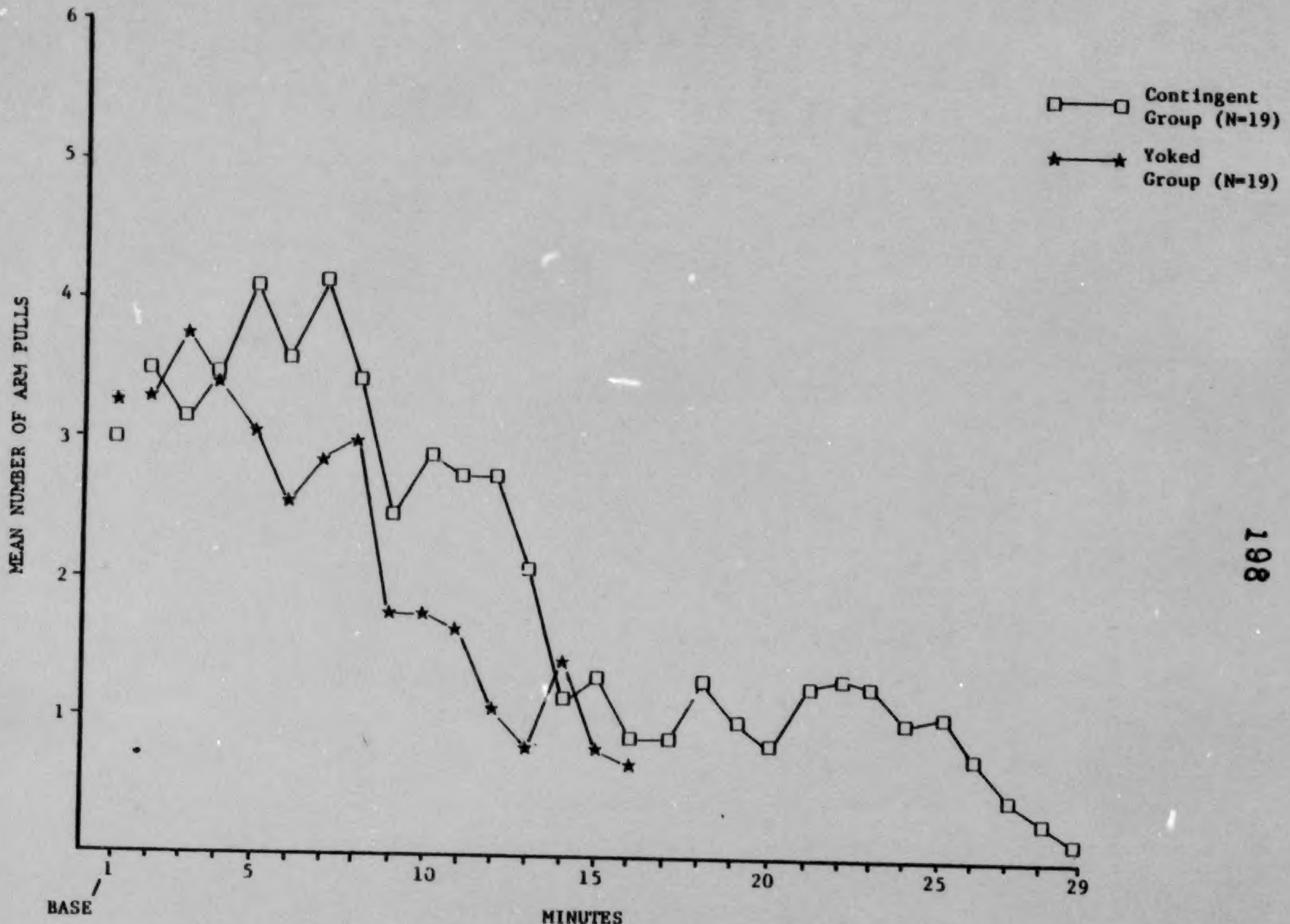


Figure 32. Minute-by-minute mean arm-pull rates for contingent versus yoked subjects.

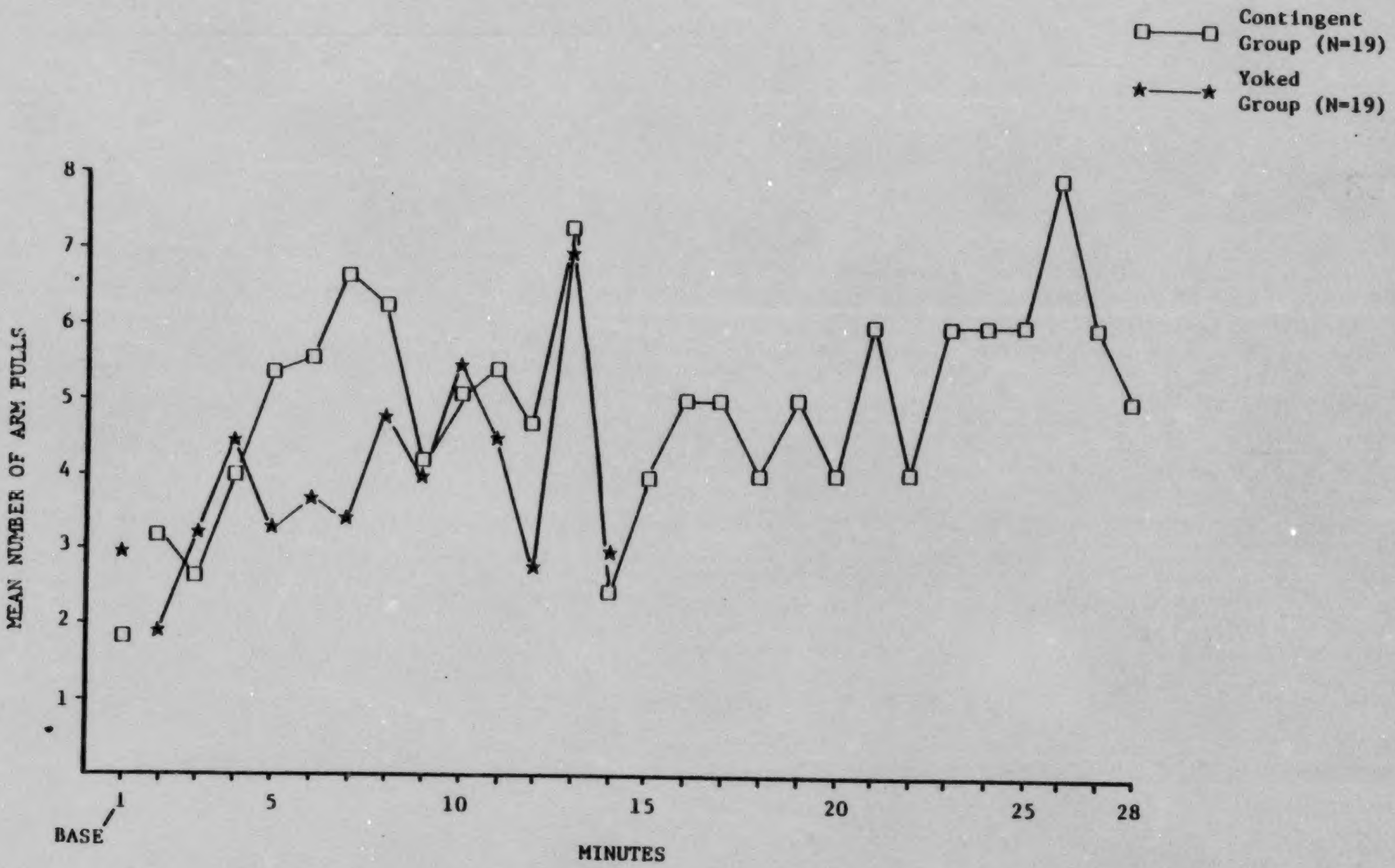


Figure 33. Minute-by-minute mean arm-pull rate for female subjects.

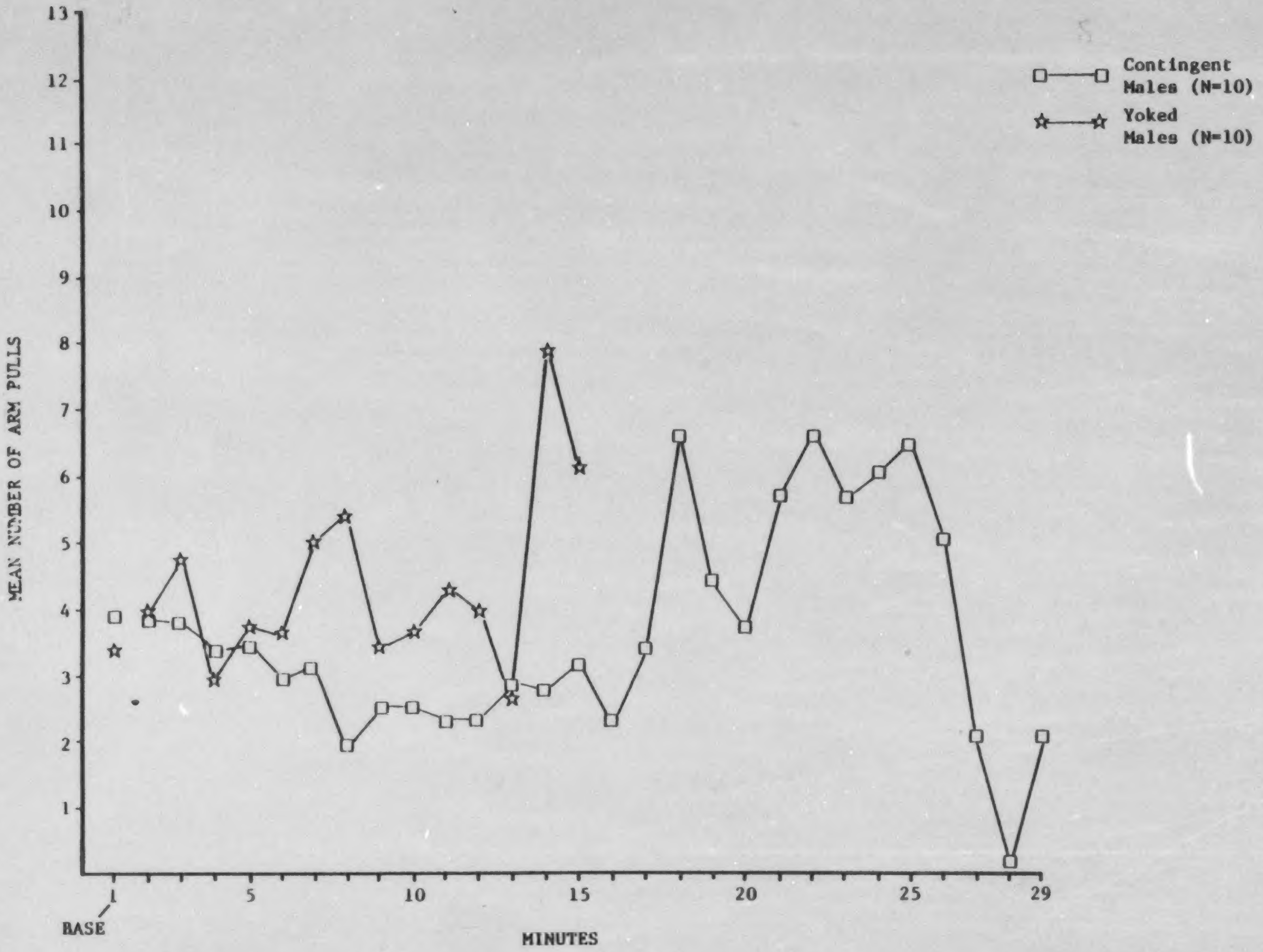


Figure 34. Minute-by-minute mean arm-pull rate for male subjects.

contingent subjects would remain in the contingency situation longer than the yoked subjects. Of the 19 pairs, 12 did so with more female pairs doing so. The contingent and yoked subjects did not differ with respect to smiling ($p < .10$).

Implications

The present study suggests that 10-week old infants exhibit some but not overwhelming evidence of contingency learning. This result is consistent with the conjugate learning studies of the Rovee-Collier group who report that learning is attained at 8 weeks of age (footkicks) but that the process is more gradual and a lower asymptote is found than in older subjects (Rovee-Collier & Fagen, 1982). In our own investigation which employed a very different type of reinforcing consequence, contingent and noncontingent subjects were found to differ depending on the outcome measure. Arousal differences between the groups were implicated as mediating learning effects. Interestingly, females were most likely to exhibit evidence of learning, as indexed by accelerated responding, early in the session. This latter result may be a function of early maturational differences between the sexes. The infrequent occurrence of positive affect at this age made comparisons between groups difficult but was probably a function of the fact that smiling has only begun to emerge as a response at this age. Taken together, these results indicated that more information was needed on the development of contingency learning and related affective changes, issues addressed in subsequent studies. The results from this ten-week-old sample were analyzed together with the results of a 16 and 24-week old sample to examine developmental trends in learning and affect.

Finally, a number of measurement issues were raised by the present study. Different indices provided different views of learning at 10 weeks and individual differences were apparent. The rhythmic cycling of response rates which rose and fell several times before the session terminated in a majority of infants has not been previously addressed in any study of contingent learning. Recently, Thelen (1981) who has extensively studied rhythmic stereotypes in infant motor behavior has suggested that such cycling is a natural characteristic of the infants' early motor behavior. Her work coupled with our own suggests that 1) a one minute baseline may be inadequate to accurately capture an infant's actual mean response rate since one may inadvertently capture response at a peak or trough of his typical rhythm and 2) it may be profitable to consider changes in the variability of this rhythm across a contingency session rather than to rely solely on absolute changes in response rate as a measure of learning. Clearly, multiple measures of learning are necessary to accurately assess young infants' responses to contingency.

Study 2: Contingency Learning in Premature Infants

Rationale

This study was designed in conjunction with the previous study. Given the trends in contingency learning exhibited by the normal 10-week-old infants, we were interested in whether or not premature 10-week-old would have similar learning curves. Furthermore, we were interested in the issues of affect and arousal as they relate to contingency experience, especially since young prematures sometimes show arousal-dampening deficits.

Method

Subjects. Six premature infants (identified by birth weight) were seen and all received contingency experience. These infants had been home at least 6 weeks, were 10 weeks of age (chronological age, not gestational age), were Caucasian, and were from middle class homes.

Condition. All infants received a 1-minute base line with no stimuli and a variable time contingency trial in which every arm pull resulted in stimuli. The session continued until infants exhibited 30 seconds of fussy behavior or eyes closed.

Procedure. The infants were placed in an infant seat in front of a screen and speaker with the mother behind. The arm pull mechanism (velcro and string) was attached to the right wrist and the slack adjusted (and readjusted if needed during the trial). The string controlled the stimuli.

Stimuli. A colored slide of a smiling baby and a song sung by children were the stimuli, which were presented simultaneously for 3 seconds per presentation.

Results and Implications

The data for the premature 10-week-old infants was very similar to the data for the normal 10-week-old infants. In Figure 35 mean arm pull rates and length of time in the session are presented for the premature and normal contingency subjects. As can be seen, no differences appeared: premature subjects exhibited arm pull rates similar to the term contingent subjects, suggesting that the incidence of contingency learning does not exhibit the developmental lag that most developmental skills exhibit in young premature infants. Alternatively, since 10-week-old prematures typically function like normal 8-week-olds, perhaps no developmental differences would appear between 8 and 10-week-old normal infants. Affective and arousal rates were also similar, as were the number of infants reaching the different criteria.

Study 3: Contingency Learning in 16-and 24-Week-Old Infants

Rationale

The findings of Studies 1 and 2 suggested that developmental changes in contingency learning be explored. This was true since the premature and term infants responded similarly, the term infants contingency learning was dependent on variables examined, and affective responses were low. Therefore, two older age groups were chosen to be tested; these include 16- and 24-week-olds.

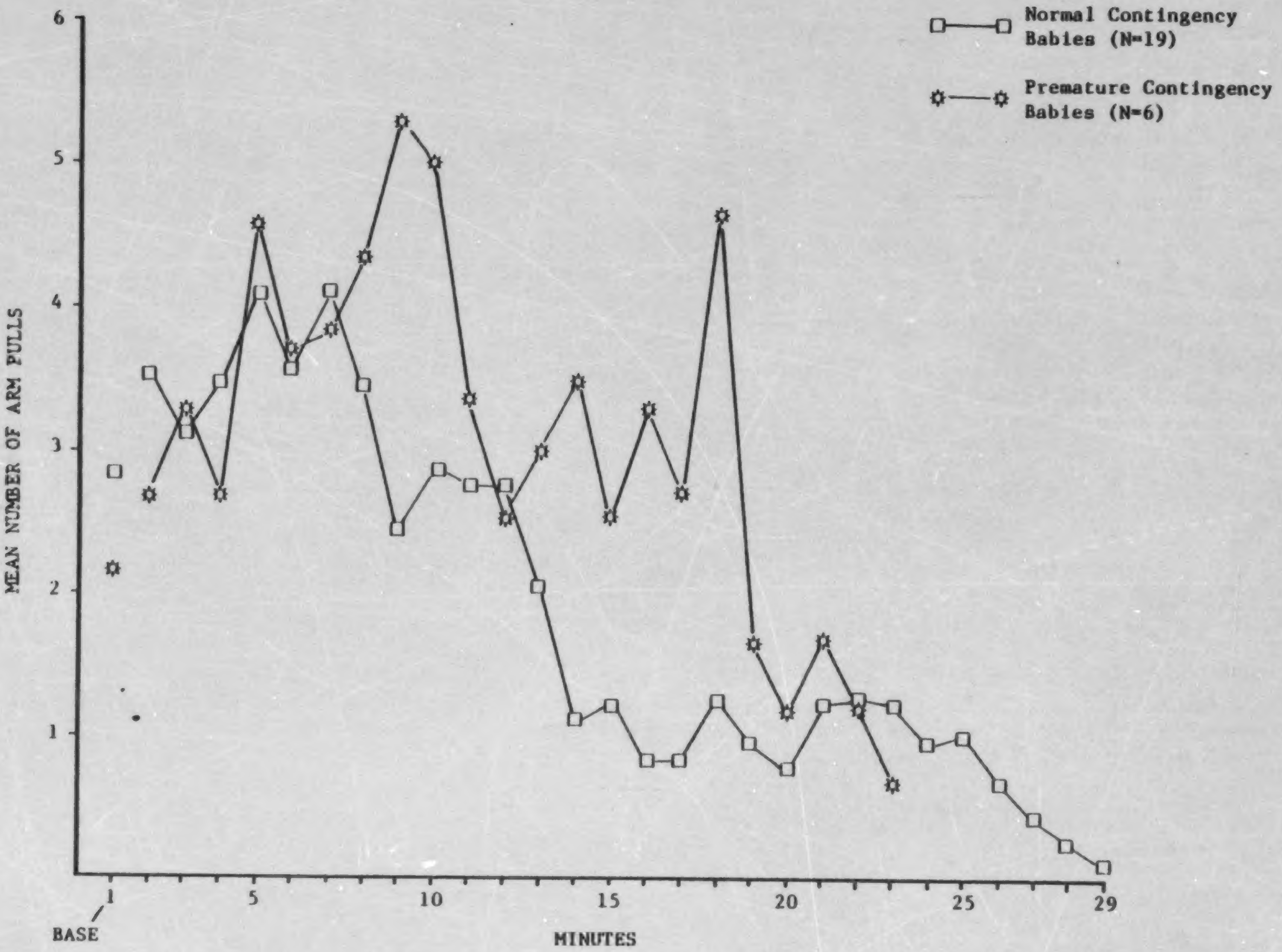


Figure 35. Minute-by-minute mean arm-pull rates for contingent normal and premature subjects.

Method

The method was identical to Studies 1 and 2 in order to facilitate comparisons. The two age groups that were selected represent still relatively young infants, have been used in other studies, and are comparable in developmental age to many of the handicapped infants being seen by the Intervention Unit. These infants are 16-weeks and 24-weeks of age (± 2 weeks). Ten pairs of contingent and yoked subjects were seen at each age.

Results

The results are discussed separately for each measure of interest, i.e. armpulls, time in experiment, affect and attention. Initially, univariate repeated measures analysis of variance were conducted for each dependent variable over factors of Age(3), Sex(2) and Condition(2).

Armpulls. The analysis revealed a highly significant effect of condition ($p < .005$) which indicated that the mean responses of contingent subjects exceeded that of noncontingent subjects. This was true of both matched and unmatched data. The frequency of armpulls attained by each group is depicted in Figure 36. It can be seen that there were no significant differences between group either in baseline or in the initial minutes of the session.

Interestingly, after the fourth minute, as the curves diverge, the peaks and troughs of the group curves appear to mirror each other. Bearing in mind that the rate of stimulation is the same for both groups of subjects, it may be that as the contingent subjects are actively experimenting with their control of the audiovisual stimulus, by increasing their rate of response, noncontingent subjects are inhibiting their activity to attend to the increased rate of stimulation (which they cannot control). Alternatively, as contingent subjects' rate of producing a consequence slacks off, noncontingent subjects tend to exhibit acceleration in their response rates. In the fashion of a circular reaction, they may be generally increasing their movements in an attempt to maintain the "interesting" spectacle.

There were also significant Age, ($p < .03$) and Age x Condition ($p < .001$) effects. Overall, 24-week olds were more active than both 10- and 16-week olds (See figure 37), although this effect was attributable to differences among the contingent subjects. The 16- and 24-week old contingency subjects produced significantly more armpull responses than their noncontingent counterparts (dependent $t(19)$, $p < .02$) and significantly exceeded baselevels (Wilcox). As can be observed in Figure 37, the most striking difference within session occurred among 24-week-old contingency subjects who exhibited the greatest response increment contrasted with the other two age groups (both Scheffes, $p < .05$). Developmental changes in learning were evident . There was no evidence of a sharply accelerating learning curve among 10-week-olds as was apparent for the 16- and 24- week old contingent groups. Even the initial period of response suppression marked among older subjects was absent for 10-week-old contingent subjects. The armpull data suggest that either the contingency

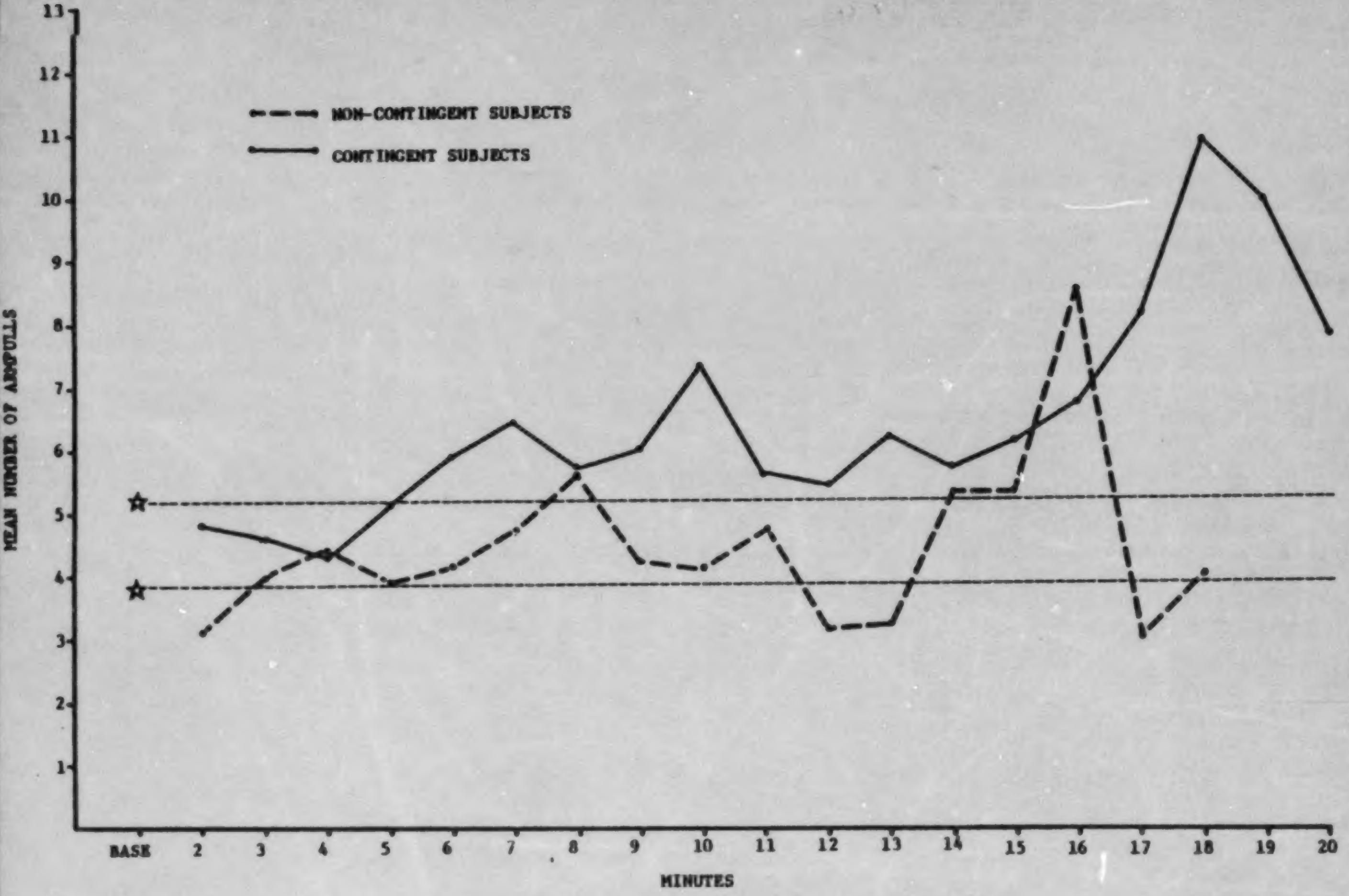


Figure 36. Mean number of armpulls per minute for contingent and non-contingent subjects.

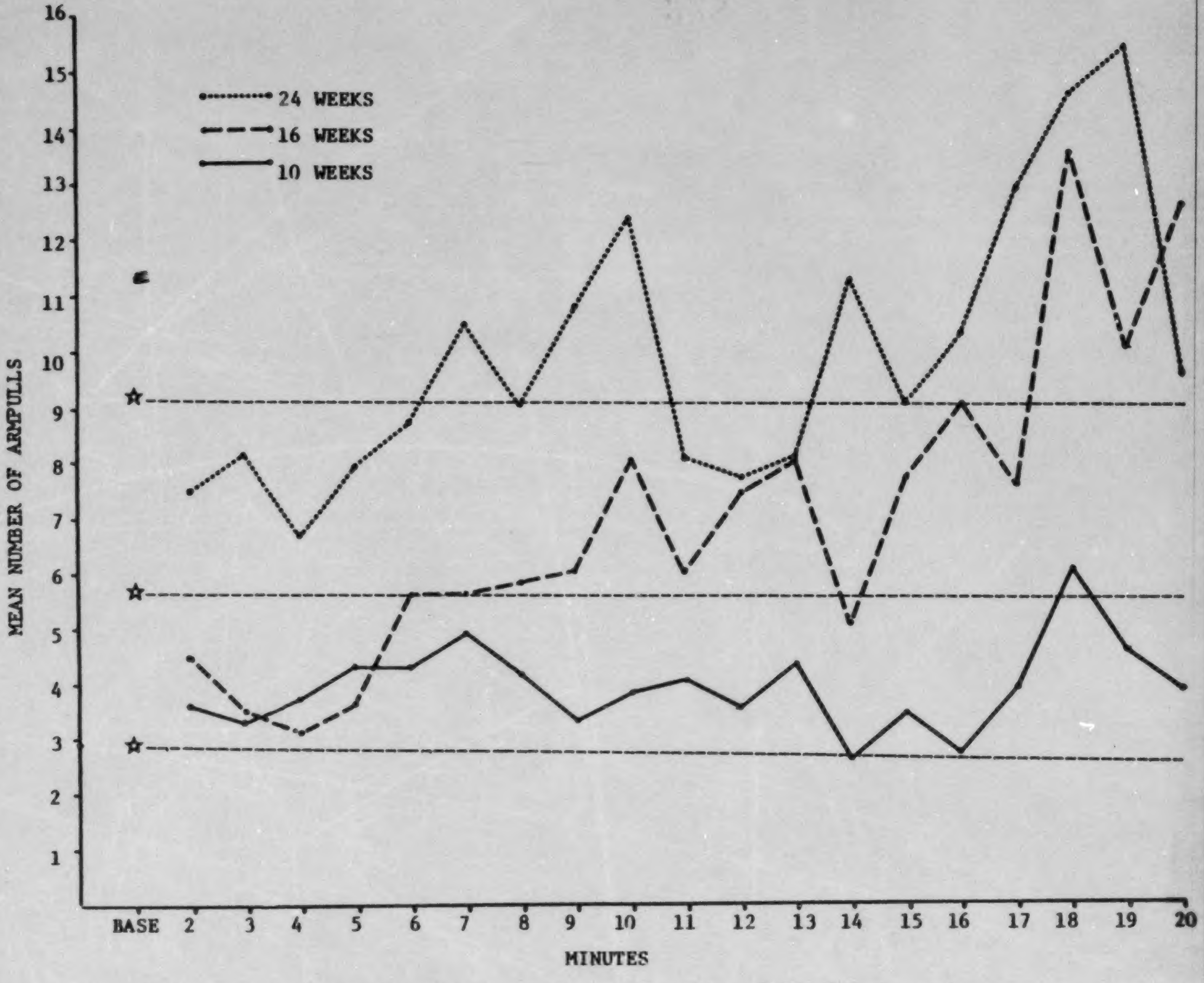


Figure 37. Contingent subjects - Mean number of armpulls by minute by age.

was not mastered as well by the 10-week-olds or was perceived sufficiently late in the procedure that state factors intervened to terminate the procedure. The pattern of age differences observed in the present study supports the view of intellectual development advanced by McCall, Eichorn & Hogarty (1977). In their view, a 2-month-old is essentially a "stimulus selection device...motorically passive and perceptually responsive" (p. 24). Active manipulation of stimuli was described as emerging between 3 and 4 months of age when it is fully established. This active manipulation, represented by a well defined learning curve is present among 16-week-old contingent subjects in the present study. Apparently, as was suggested earlier, stimulation in general served to arouse the youngest infants to exceed baseline and to maintain that response without the perception that a specific action on their part was the means of producing the stimulus. That is not to say that 10-week-olds cannot learn; clearly they can (Rovee-Collier & Fagen, 1981). It may simply take them longer as Rovee-Collier and colleagues (1979; 1981) have suggested. Moreover, special characteristics of certain schedules, or particular types of reinforcers may serve to enhance learning in this age group. By 16-weeks of age, however, infants are able to master a nonconjugate contingency, the discrete onset of slides and sound through the use of a response not previously linked with such outcomes. Even at this age though, acquisition is more gradual than at 24 weeks. At least for the older infants, contingent versus noncontingent stimulation provides an experience that is perceived and responded to differently and which should be reflected as well in other aspects of behavior which may be termed motivational.

Task Involvement: Time in Experiment

Contingent subjects, irrespective of age, spent a greater length of time in the procedure than noncontingent subjects ($p < .0001$). Thus, infants receiving contingent feedback at each age were those most willing to remain actively involved with the apparatus(dependent $t(9)$ $p < .002$). Noncontingent subjects not only terminated sooner than their contingent counterparts but spent proportionally more time fuss/crying (Wilcox, $p < .058$). See Figure 38.

A Sex x Condition interaction effect was also obtained, ($p < .04$). Male contingent subjects remained in the procedure longer than female contingent subjects. Males were also less tolerant of the noncontingent condition than females and terminated their sessions much sooner, invariably by crying (all t's(9), $p < .03$). See Figure 39.

Affect

Analysis of the mean number of one minute intervals smiling revealed an Age x Condition trend ($p < .033$, See figure 40). Within each age group, analyses revealed that there was a trend among 10-week-olds for noncontingent subjects to smile more than their contingent counterparts ($p < .10$).

At the remaining ages, the effect was in the predicted direction with 24 week old contingent subjects smiling significantly more than noncontingent counterparts (dependent $t(9)$, $p < .05$) and 16-week olds exhibiting a trend in that direction.

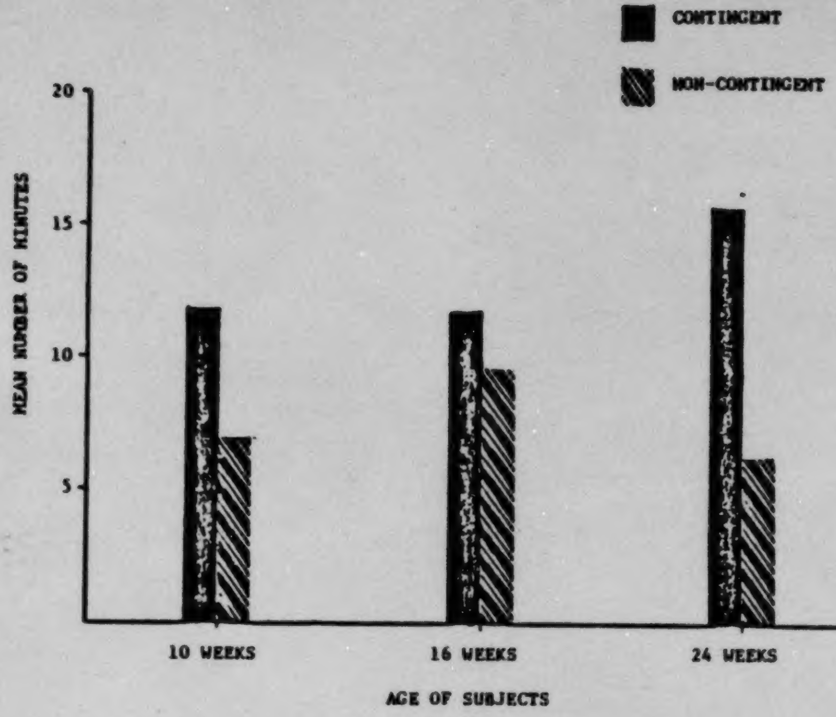


Figure 38. Mean number of minutes spent in experiment by age and condition.

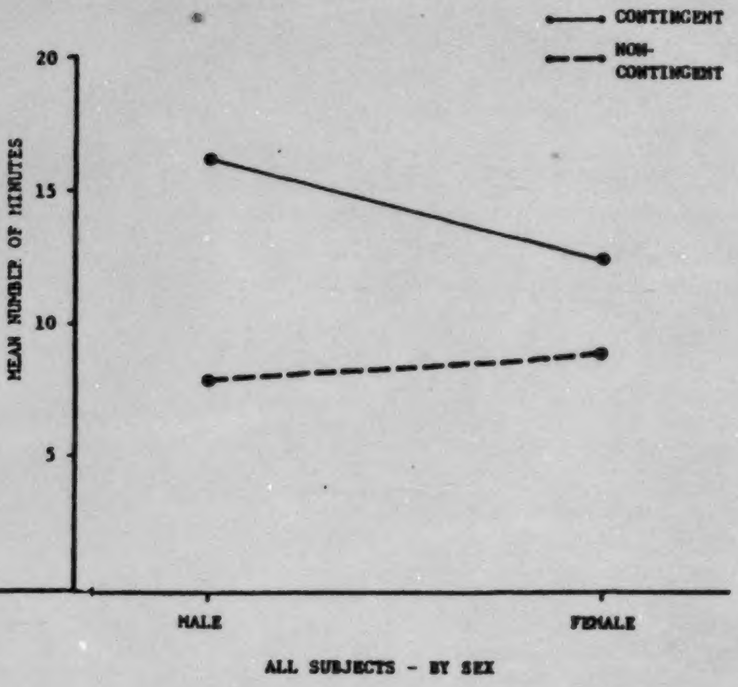


Figure 39. Mean number of minutes spent in experiment by sex and condition.

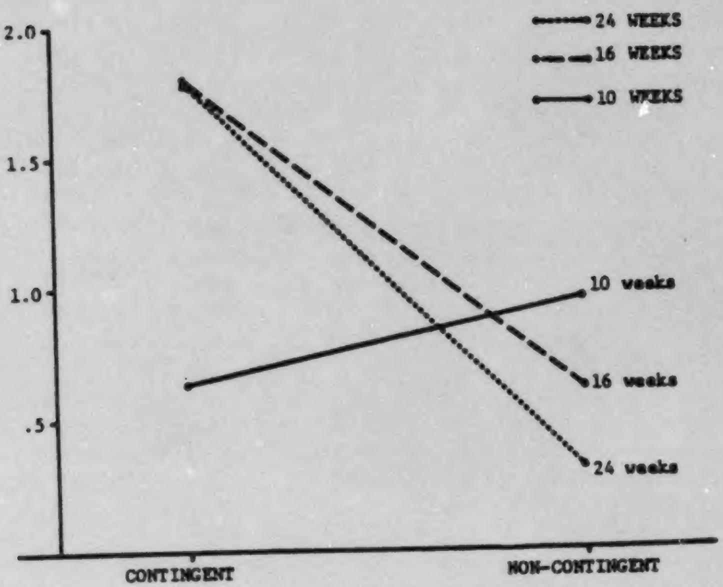


Figure 40. Mean number of one-minute intervals smiling by age and condition.

Attention

Since evidence of learning by 10-week-old contingent subjects occurred extremely late in the session, it may be that the relatively long pre-learning axis for 10-week-olds may mask subtle changes in attention which coincide with contingency awareness. A finer analysis of attention during learning and perhaps alternative measures of attention/interest may clarify this issue.

Two measures of visual attention, (1) the number of 60-second intervals during which fixation occurred and (2) the mean length of visual fixation, were analyzed. The first measure is a frequency variable which indicates whether or not the reinforcer was attended during each minute of responding irrespective of the length of fixation. The second variable indexes the average duration of looking per minute for each subject. Analyses indicated that contingent subjects, irrespective of age, visually engaged the reinforcer a greater number of session minutes than noncontingent subjects did, ($p < .0001$). That is, the contingent subjects irrespective of age looked more consistently over the length of their sessions than did noncontingent subjects. The only other effect on this variable was a nonsignificant trend ($p < .065$) indicating that male contingent subjects tended to look more minutes than did any of the other groups (i.e. noncontingent males and both contingent and noncontingent females). Thus, we may conclude that the contingent stimulus sustained more interest in subjects of all ages, a result consistent with the length of the session variable. Contingent subjects were not only willing to remain in the session longer and they were more likely to look at the reinforcer more of the minutes that they stayed in the session. There were no significant condition effects for mean length of fixation, however. When average length of fixations is considered, both noncontingent and contingent subjects averaged the same amount of looking time per minute. This occurred despite the fact that armpull response rate of contingent subjects was markedly accelerated with respect to noncontingent subjects in the later minutes of the session. Age however, exerted a highly significant effect on the mean length of fixation, $F(2,33) = 33.40$, $p < .0001$, indicating that independent of the type of stimulation (contingent or noncontingent), 10-week-old subjects spent more time per minute attending the stimulus than either 16-or 24-week old subjects (all Scheffe's, $p < .05$). If we accept attention as an index of stimulus processing as suggested by Kagen (1972), Cohen, (1973), Fagan (1975) and others, this result coincides with the armpull measure in suggesting that 10-week-olds are less efficient processors of stimulus input than older infants, i.e. they are spending more time looking at and presumably assimilating the stimulus, and again confirms that global measures of looking and attention are uncorrelated with arm response. In the present study, the 10-week-old subjects (both contingent and noncontingent subjects) are looking more but pulling less than the other groups. What is interesting, however, is that the effect occurs independent of the contingent vs. noncontingent quality of the stimulation.

Implications

In addition to documenting age differences in contingent learning in the first six months of life, the present data also speak to the impact of contingency on the motivational state of the very young infant. Lewis & Goldberg (1969) and others have suggested that being in control should have very powerful motivational consequences. In the present study, the significant differences observed between length of time in the procedure (task involvement measure) indicates that infants receiving contingent consequences are willing to remain in the procedure without fussing at all ages and tend to smile more than their noncontingent counterparts. The effect of task involvement and decreased fussiness is present even among 10-week-old contingent subjects who were not differentiated from their yoked counterparts on the arm pull measure and demonstrates that 10-week-olds perceive contingent as opposed to noncontingent stimulation as qualitatively different, despite their less well-defined learning curves. This in turn suggests that contingent stimulation has a significant impact on the organism even before demonstrable learning has occurred. The appearance of other behaviors incidental to the learning process (e.g. eye opening, postural changes, such as leaning forward or lifting of the head and increased smiling) often occurs, suggesting the very wide-awake interest of these children in the procedure prior to the time they may be said to have learned the contingency. Such behaviors may be termed affective or motivational and appear to naturally accompany the learning process. Smiling, the measure of facial affect in the present investigation was clearly associated with contingent stimulation among the oldest infants. This particular affective measure is thus consistent with the armpull measure and can be interpreted as indexing poorer processing of the contingency at 10-weeks of age. The meaning of the smile response in the learning process seems to be, as suggested by several theorists (Zelago, 1972; Piaget, 1952), that information has been assimilated. That is, this particular affect is released after information has been processed or assimilated. It's absence among 10-week-olds suggests either that they failed to fully process the contingency or failed to process it at the same rate as older subjects. The task involvement measure and the suppression of negative affect, on the other hand, occurred despite poorer learning among the 10-week-olds. In this case, the affective measures appear to be somewhat independent of mastery of the contingency, a result most consistent with the view of affect advanced recently by Zajonc (1980).

The present results indicate that the interplay of affect and cognition during infant learning is more complex than heretofore proposed and suggest that the affective component may be subject to less developmental change than other aspects of contingency experience. Our next investigation was directed to direct examination of these hypotheses.

Study 4: Facial Affect and Contingency Learning at 6 Months of Age.

Rationale

The study seeks to examine in detail the relationship between affect and cognition as they interact during a simple contingency learning task by examining facial expressions of infants at select points during the learning process. Our previous investigations and observations seemed to suggest that affect was not only an important result of the contingency experience but that it occurred early in the process of learning and even among the youngest. Individual learning curves of infants at 6 months of age were segmented into phases which reflected stages of the learning process and differences in facial affect patterns between these phases were examined. We wanted to determine whether facial affect indexes the emerging awareness of the contingency between response and feedback. That is, is facial affect the behavioral reflection of an "Aha!" experience or a response independent of and one which precedes cognition in a learning task?

Method

Subjects. The subjects were five of the 6-month-old contingency subjects of the previous study. In addition to automatic recording of armpull and observational data, closeup videotapes of infants were obtained as the infants responded to the contingency.

From our sample of infants we selected five, 6-month-old infants (three boys, two girls) who exhibited classic and well differentiated learning curves. Start and end times of all phases were identified. Each of these curves were segmented into the following common phases.

Baseline. One minute of nonreinforcement.

Initial orientation to stimulus events. This phase follows baseline immediately and is the infant's first encounter with the contingent stimulus. Learning of the armpull response remains at or below baseline. The initial orientation phase typically lasted several minutes.

Initial contingency awareness. This is the phase of response acceleration beginning from the first minute in which armpull responses exceeded baseline through the attainment of the highest asymptotec level of responding. Although the curve need not necessarily be linear, the overall trend observed in all five curves was one of response acceleration. Some children accelerated more rapidly than others.

Response asymptote. Asymptote is the period of greatest response defined by the acceleration phase on one side and a continuous decline on the other. The period of asymptote was comparatively brief, lasting usually about two minutes.

Post-asymptote. This the phase following asymptote through the end of the session. Typically, responses dropped off quite dramatically during this period although responding did not invariably return to baseline level. The drop off in response may signify either habituation or fatigue.

Because individual session lengths were variable as were rates of learning, the length of each phase was also variable. However, by determining specific phases on each individual curve we hoped to sample selectively comparable points of the learning curve within each phase and thus to capture qualitatively similar moments during the learning experience.

Procedure for Coding Facial Behavior

Facial movements were coded from videotapes of the infants using the Maximally Discriminative Facial Movement Coding System, commonly referred to as the MAX system (Izard, 1980). MAX was chosen because training manuals are available and it can be used reliably without excessive training time. In addition to coding facial movements, a number of other behaviors of particular interest in a contingency context were also recorded. Orientation of the head when other than full-face front served as an index of inattentiveness to the consequence. Infants might look away from the reinforcing stimulus either by casting their eyes down (which is codable in MAX) or by looking to either side (which is not codable). Looks-at-hand is also an interesting behavior in our contingency context since it suggests an awareness of the ribbon and perhaps perception of means-end in the contingency. Looking-at hand was scored when both the subject's hand with the velcro bracelet and the subject's eyes were in view and the subject's gaze was oriented toward that hand.

Sucking lower lip, thumb sucking, and or hand sucking were frequently observed and were systematically recorded for several reasons. First, their obstruction of the mouth clearly limits judgements of emotion to the rating of only the upper regions of the face. It is useful to know the reason that an important emotional cue is missing. Second, the role of sucking and other oral behaviors (e.g., pacifying or comforting and self-stimulation) are well known. Thus while not emotional behaviors of themselves, these oral behaviors may be motivated by stress or boredom. Finally, vocalizations, fussing and crying were also coded.

The coder sampled videotapes in three-second segments based on the predetermined phase times marked on the coding sheets. Nine minutes of facial behavior were coded for each subject consisting of (1) one minute of baseline, (2) the first 60 seconds of the contingency experience immediately following baseline (3) 60 seconds prior to initial response acceleration, (4) the first 60 seconds of acceleration; (5) 60 seconds prior to peak response; (6) first 60 seconds of peak response; (7) 60 seconds prior to decline in response; (8) first 60 seconds of decline, and (9) the last 60 seconds in the session.

Four passes were made through each tape. During the first three, with the volume off and in slow speed, brow, eye and mouth regions of the face were coded respectively. During the fourth pass, with the volume on and at normal speed, vocalization and fuss-cry behavior were noted. To code facial movements, the coder viewed three-second segments of behavior, noting all codable movements in sequence. One code per segment was most common; however, two to three changes also occurred, particularly during phases 2 and 3. If a movement began in one segment but ended in the following segment, it was coded for the interval in which it first appeared. No attempt was made to record duration of appearance changes. In our experience, it appeared that some expressions, such as Interest, could be relatively enduring while others, such as Enjoyment (i.e., smiling), were typically very brief. The measure then is the number of three-second intervals in which a given expression was visible without regard to it's duration.

Preliminary Results

Figure 41 presents the mean number of expressed emotions as they relate to the specific phase of each subject's learning curve. It should be kept in mind that the temporal parameters associated with each phase are different for each subject. Nevertheless, the coding system allows us to observe emotional responses by phase across subjects. Since three-second intervals across a minute of coding were used, the maximum number of facial expressions is 20. However, since more than one facial expression was possible in a three second period, it is possible that each facial expression could occur a maximum of 20 times. Thus the total number of different expressions per coded period can, and indeed sometimes does, add to more than 20. For convenience, figure 41 presents three separate graphs, one representing positive expressions, one representing negative expressions, and one representing control behaviors. Let us consider each in turn.

The positive emotions of Interest, Surprise, and Enjoyment have distinct patterning in relationship to the learning phase. During the base period after the child has been placed in this new situation, Interest is high while Surprise and Enjoyment are quite low. In fact there is only a small amount of Surprise. At the onset of the reinforcement in 1a (slides and music) there is a marked decline in interest expressions and a slight increase in surprise expressions; Enjoyment remains low. The same pattern applies for the last phase of the orienting period (1B). The onset and acceleration phase of learning are characterized by an increase in Interest and Surprise and also a slight increase in Enjoyment. Indeed, this period is marked by the highest level of Surprise and Interest (except for the base period when Interest was also high). Asymptote is characterized by a decline in Interest and Surprise but Enjoyment peaks. Following this phase of learning, all positive expressions declined.

The data indicate increases in positive expressions around the point of acquisition. Surprise and Interest peaked during the acquisition phase, Enjoyment peaks at asymptote. Lewis and Goldberg (1969), discussing violation of expectancy, suggested that Surprise and Interest (more general emotions) should occur prior to specific emotions such as joy or fear. The patterning found here supports the notion that Surprise precedes Enjoyment, indicating that the process of acquisition of information may be related to arousal with the final discovery related to Enjoyment. The sequence of cognition and emotion may be that of interest-surprise as an arousal mechanism for keeping the infant at the task, following the relationship with consequence.

With regard to the negative expressions, their occurrence was infrequent during baseline. Negative expressions occurred during the orientation phase

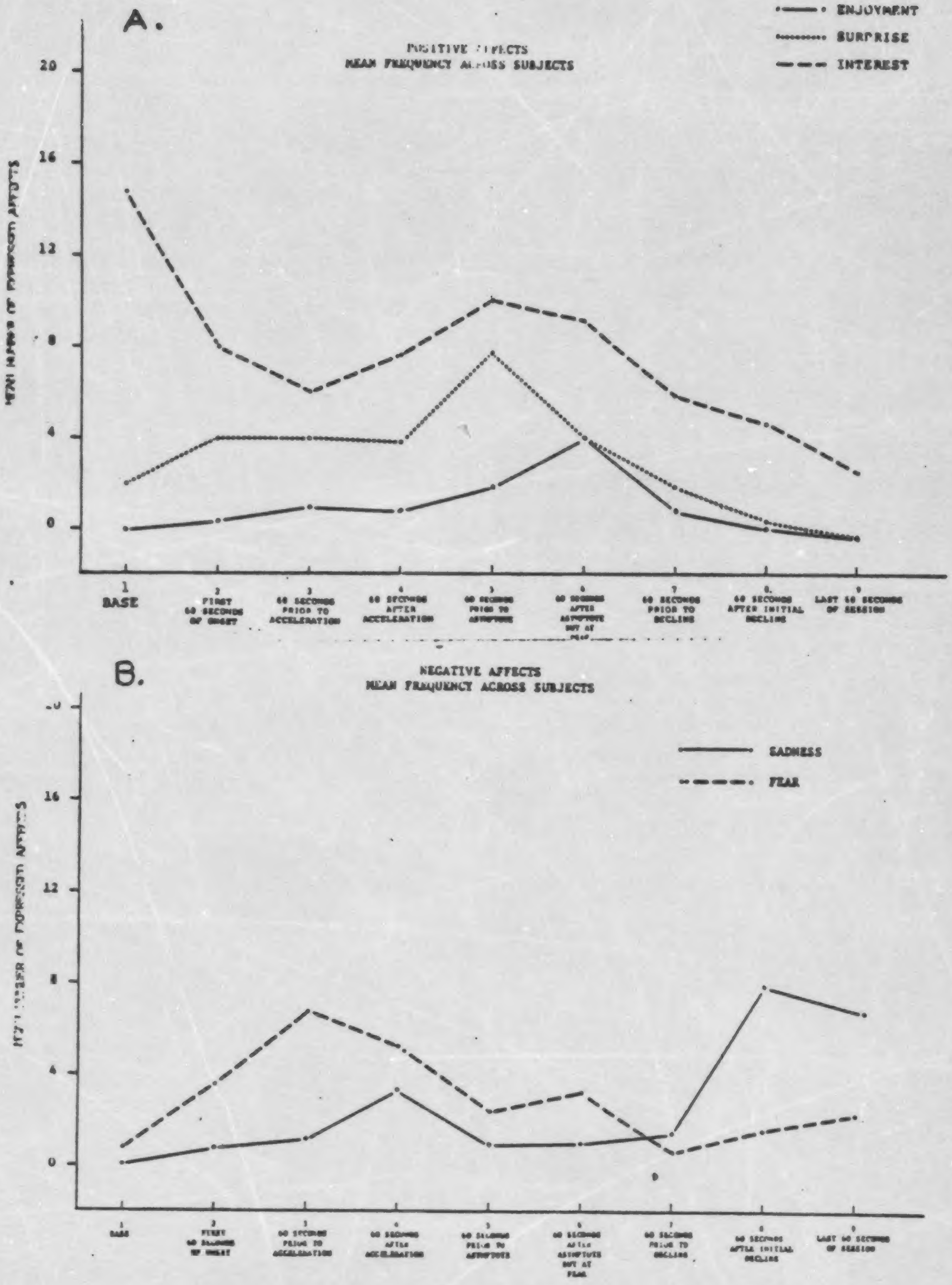


Figure 41. Infants' emotional expressions during phases of learning.

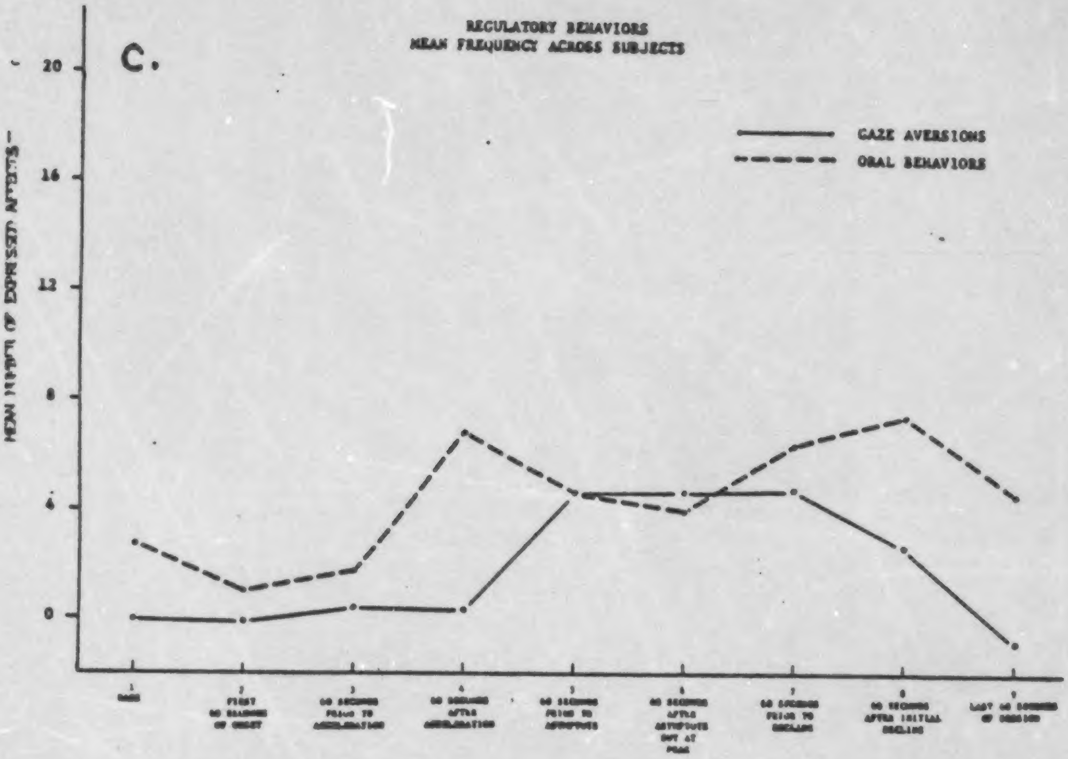


Figure 41 (con't). Infants' emotional expressions during phases of learning.

(1). In fact, Fear reached it's highest level during this phase. During phase 2 (the acquisition phase) Fear declined and remained low thereafter. Sadness-unhappiness showed relatively little change except during the post-asymptote period. Here, as Interest and other positive expressions declined, Sadness-unhappiness reached it's highest point (perhaps because there were no new mountains to climb). The negative facial expressions appeared to be a reciprocal of the positive.

Figure 41c presents the sequence of appearance of the two control behaviors, head-gaze aversion and oral behaviors. These behaviors show still a different pattern. There is relatively little head-gaze aversion or oral behavior during the base or orienting phases. Both classes of behavior increase markedly during the acceleration phase and remain high throughout the rest of the session, although some decline can be seen during the last phase. Most notably, these behaviors increase at the time when the negative expressions decline and a positive expression increased. However, they remain high during asymptote and deceleraction of response.

Without doubt, the most frequent facial expression is Interest. This should not be surprising, since the task was designed specifically to interest these infants. The next most frequent expressions were Surprise and the self-regulatory behaviors. Enjoyment, Fear and Sadness-Unhappiness were relatively infrequent events. In fact, in only one phase did Enjoyment occur more than 20% of the time. Fear, on the other hand, occurred in three periods more than 20% of the time. The frequency of appearance of Sadness-Unhappiness was comparable to that of Fear.

Implications

These data taken together bear on several issues. First, the "simple contingency task" is not quite so simple after all but requires the cognitive and motivational investment on the part of the child. Changes in the type of affect appear to occur at predictable points in the process as indexed by transition points in the learning curve, but the child is affectively involved continuously with the task. Certain affects occur with resolution (enjoyment); others such as interest, cycle. Moreover, it appears that infants, at least at 6-months play an active role in controlling their affective responses as they do in their motor behavior. This latter point brings in a second issue raised by the data regarding the orienting response and learning. It has been argued that in order for learning to take place there must be an habituation of the orienting response (Sokolov, 1963). Our data suggests that this is indeed the case. The orienting response that occurs at the onset of reinforcement results in a complex set of responses. First, armpulling behavior declines as expected, since orientation results in the cessation of activity.

In addition, a Fear response, perhaps a sign of wariness or vigilance, rapidly increases during the orienting phase and then, interestingly declines somewhat but still remains at a relatively high level.

It is following this orienting period that learning seems to occur. Once the subject's armpulling behavior returns to baseline, armpull rates gradually increase. Lisewise once Fear diminishes, Interest begins to increase. Thus it seems that the habituation of the orienting response consists of a decline in Fear, resumption of activity and an increase in Interest.

It should also be noted that this change in emotional behavior accompanying the habituation of orienting has as a concommitent response an increase in self-regulatory behavior. The self regulation may serve the function facillitating the change in affect, Thus, for example, in order for the infant to become less fearful and more interested it may be necessary that the infant seek self-regulation through self-stimulation. Although there are no data yet to support this view, the control of fear through self-regulation may allow for the increase in interest and activity (armpulling).

The habituation of the orienting reflex appears to be comprised of emotional states nonconductive to learning, in particular, the cessation of activity that is often associated with wariness. The task of self-regulation would be to reduce this wariness, thereby reducing orientation. Once orientation is reduced, learning can continue. In a sense, the habituation of orienting is envisioned not as a cognitive activity but as a emotional activity whereby those emotions contributing to orientation are eliminated. Consequently those affects associated with learning can occur. Such a view is purely speculative. Nevertheless, it suggests a model in which orientation-habituation is less an information processing process and more an emotional-arousal one.

It would be particularly relevant to examine developmental changes in these processes particularly in light of the fact that our data suggest that 10-week-olds learned less efficiently and similar arousal changes were implicated in our analysis of the behavior of contingent vs noncontingent subjects at 10 weeks. The principle failure of less efficient learning at 10 weeks may reflect poor ability to modulate arousal at this stage. We find our data to have relevance not only to theoretical issues of learning and cognition but also to practical questions of how to assess clinically a child's response to contingency experience. We are endeavoring to obtain additional findings to continue this line of inquiry, since the personnel time needed to code this data is quite extensive.

Study 5: Contingency Learning, Affect, and Arousal in One-Year-Old Infants

Rationale

The present study is an extension of our earlier work, in that it examined contingency learning, affect and arousal, but with older infants. We explored contingency learning in one-year-olds since 1) we found dramatic changes from 10- to 24-weeks of age, 2) many handicapped infants are not placed in infant stimulation programs until the second year of life (due to delayed diagnosis and inadequate referral procedures, and 3) there is no information on contingency experience with older infants on which to base our intervention strategies.

Since the one-year-old may handle more elaborate apparatus, more complex experience (Fagen, 1979), and more varied outcomes, various procedures were pretested. The one that is the end result of the pretesting is briefly described below.

Although various aspects of the apparatus were modified for older infants, an arm movement response was retained as the operant. It was the response most naturally available to these subjects and would allow us some comparability with our earlier samples. Our previous success with a combined audio-visual consequence led us to retain a reinforcer with dual modalities. However, since only two studies have compared the effectiveness of social and non-social consequences for social responses (Haugen & McIntire, 1972; Weisberg, 1963), we chose to use both types of consequences in our design which utilized a nonsocial response (i.e., arm pulls).

Method

Subjects. A group of 20 subjects was tested between 12 and 13 months of age (mean age = 12 months ± 2 weeks). All were middle class apparently normal, healthy infants. Half were girls, half were boys.

Procedure. During this contingency task, infants were seated in a high chair approximately one meter from a screen and speaker. The contingency apparatus consisted of a tiller-like lever which the subject could move either to the left or the right to trigger presentation of a visual stimulus. Each subject received a one-minute baseline period in which lever movement to either side resulted in no stimuli, and then a series of contingency conditions each lasting 4 minutes each: 1) left move-novel stimulus, right move-novel stimulus; 2) left move-novel stimulus, right move-familiar stimulus; 3) left move-familiar stimulus, right move-novel stimulus; 4) left move-familiar stimulus, right move-familiar stimulus; 5) left move-novel stimulus, right move-no stimulus; 6) left move-no stimulus, right move-novel stimulus. The six conditions were counterbalanced across subjects. Stimuli consisted of slides including social (pictures of babies, children and adults) and nonsocial (lines—different from the ones used in the habituation task categories). The entire session was videotaped, and measures included: 1) the number of lever movements (both left and right); 2) number and type of stimulus seen (social versus nonsocial); 3) smiling; 4) fixation; 5) positive vocalization; 6) fretting and crying. The Carey Temperament Scale was given to the parents to complete.

Preliminary Results

As can be seen in Figure 42 subjects did not differ initially in right versus left lever movements though there was a nonsignificant preference for right. This preference was accentuated in the initial four minute block during which a lever movement in either direction produced the same "familiarization" stimulus. In the ensuing block, depending on condition, either right or left movements produced a novel stimulus whereas movement in the opposite direction produced the familiar stimulus. As the bar graph indicates, preference during this block as indexed by total responses toward either novel (N_1) or familiar (F) stimuli, was for the new stimulus. Total responses to both stimuli remain about the same suggesting that the infants have essentially mastered the contingency within the first block. In the final block, the effect of introducing a second novel stimulus is two fold: First, total responses to both types of slides increase, dramatically so for the N_2 slide compared to the familiar slide (F) in the previous block. Slide N_1 is still preferred, although the difference is probably not significant. Our contingency analyses of time-in-procedure, affect and attention are directed toward confirming or refuting these alternatives.

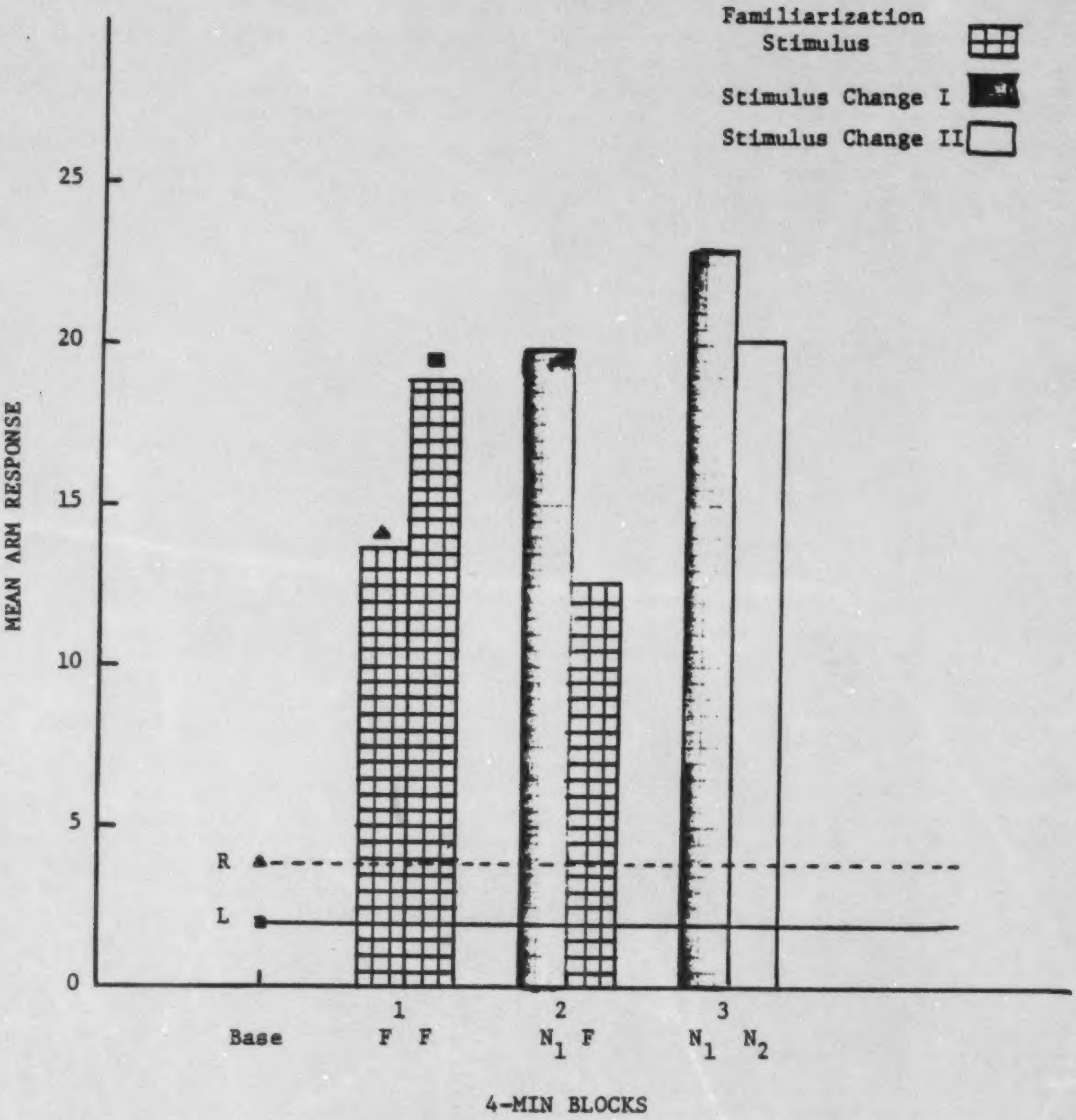


Figure 42. Mean arm responses to novel and familiar stimuli across 4-minute blocks.

1) Infants may have been engaging in "testing out" or a comparison of the stimuli.

2) or infants may continue to responde to N_1 because they have not yet become as familiar with it as with F.

3) The contingency was not actually learned until this point. (This seems unlikely given that our younger subjects seemed to learn in less than twelve minutes.)

4) Infants tended to respond on the basis of positive once a preference has been established.

Examination of changes in right and left arm movements across blocks revealed that changes in fact were best described by quadradic functions which mirrored one another. That is right responses increased when novel stimulus occurred on the right while left responses decreased. Conversely, left responses increased and right responses decreased only when the novel stimulus occurred on the left. While these data tend to rule out hypothesis 4, further analyses are needed to establish which hypothesis provides a parsimonious account of the data.

Study 6: A Longitudinal Study Contingency Experience in Nonhandicapped Infants

Rationale

A mutually constructive interaction exists between Contingency Intervention and Research Projects. Data from the Contingency Research Project substantiated the phenomena of early learning by nonhandicapped infants and provided some insight into the variability of such learning by very young infants. The various patterns of learning which emerged in the Contingency Research Project suggested that a multiple baseline design would provide an important supplement to a baseline - intervention - extinction (ABA) design. The longitudinal use of this design has generated interesting data within the Contingency Intervention Project and has led to a series of questions regarding the comparability of these learning patterns to those of nonhandicapped infants. Since nonhandicapped infants have not been studied longitudinally within the Contingency Research Project the question of comparability between handicapped and nonhandicapped infants in these patterns of learning has not been addressed.

There appears to be a more general problem within the infant learning literature regarding the criteria for learning. The bulk of that literature has involved comparisons of groups receiving response contingent stimulation with groups receiving response independent stimulation or no stimulation in fixed length sessions. While such comparisons have often produced significant statistical results it is not known to what extent such results represent the individual's performance in the experimental group. Thus, group differences can often be accounted for by the performance of one or two members in spite of the fact that several other members have shown no learning.

By necessity the Contingency Intervention Project must deal with the variability within infants across time as well as the variability between infants. The interesting individual differences which have emerged have led us to consider the form of such differences among the nonhandicapped population of infants. Thus, the relationship between the Contingency Intervention and Contingency Research Projects is synergistic.

Method

Subjects. Subjects were three apparently normal, healthy infants at each of three ages (10, 16 & 24 weeks of age). Of these nine subjects, half were male, half were female. All resided locally and came to the laboratory for their sessions at a time of day at which their mothers reported they were typically alert and playful. All subjects completed six visits. The exception, a 24-week-old, failed to complete the last 3 visits due to illness.

Procedure. In this study, nonhandicapped infants received contingency experience over a period of three weeks (two laboratory visits per week, for a total of six visits). Thus, the schedule of contingency experience received by the nonhandicapped sample is directly comparable to that of handicapped subjects in the intervention program. The apparatus is identified as well and is described in detail in the procedures section of the Contingency Intervention Project.

Either an arm-pull or a leg-kick response was conditioned to either a visual or auditory stimulus. Measures included the frequency and duration of smiling, crying, vocalization, attention, and distraction. Each new condition began with a three-minute baseline period, during which these behaviors were coded. When clear response preferences were observed, half of the subjects' responses were accommodated, while the rest of the subjects were reinforced for going against their preference. Each subject progressed through the following sequence of conditions until a total of six sessions had been completed:

1) After the baseline, subjects were conditioned to a criteria (e.g., graphically displayed within session change in rate of the target response), at which point--

2) The program switched contingencies so that the other response was required to produce the consequence.

3) If the response rates fell below a predetermined criterion based on each child's performance, indicating possible habituation to satiation with the consequence the type of reinforcement was changed, providing a test of habituation/dishabituation within a learning framework.

4) If necessary, a multiple criterion of various reinforcement changes or schedule changes was in effect in an effort to maintain the child's interest.

Each procedure was in effect for at least two sessions and the child received the subsequent prodedures only after reaching criterion in the previous situation's baseline.

All subjects completed an initial baseline period after which there was a brief respite. Subjects were removed from the apparatus at this time while the computer file was examined to determine the individual infant's perferred mode of response (arm or leg). Interestingly, it soon became apparent that the leg response was never preferred. Eight subjects exhibited a clear arm preference as determined by the difference in the mean response per minute over the 3-minute baseline period. Half of the subjects received an arm contingency, half received a leg contingency. The subject for whom there was no obvious preference (X Arm = 6.0/X Leg = 5.0) was assigned to a leg contingency.

All subjects remained in the contingency session for either 14 minutes or until they continuously fussed for more than 30 seconds. The initial program presented a simple FR1 contingency in which a stationary Tunneyville Choo-Choo (a comercially available toy adapted for use with the system) played a song and rotated its colorful wheels for 3 seconds whenever the computer detected the appropriate switch closure. The noncontingent response was also monitored by the computer to permit subsequent comparison between contingent and noncontingent responses over the course of the session. After two sessions with this particular contingency had been completed, program changes were dependent on the responses of the individual infant.

Results

Preliminary results are available and are presented separately for each age group, in light of our previous finding of ontogenetic changes in learning.

10-week-olds. Of the 10-week-old subjects, two recieved a leg contingency and one received an arm contingency. Summary graphics for each appear in Figure a. It can be seen that Joanna exhibited elevated levels of leg response (which was nonpreferred) over several sessions although the arm response remained dominant. For only two sessions (3 & 6) did mean leg responses per minute exceed that of arm, and even then the difference is probably not significant. Examination of the individual learning curves for each session is consistent with this data in confirming that the arm preference was maintained. Over the course of the sessions and particularly in the last two sessions, Joanna began the sessions with a greater leg response but when criteria reinforcement changes occurred arm and leg responses both exhibited acceleration, with arm responses leading. For Benjamin (Figure 43b) the pattern was somewhat different. Benjamin exhibited a market inhibition of arm rate in all but one session during which leg was reinforced. Evidently, this was aversive because these sessions were quickly terminated by crying, the longest lasting 6 full minutes. Although Benjamin appeared to respond more to some reinforcers than others, he invariably began fussing by the fourth minute. A second baseline was taken prior to the last session, and revealed that in the absence of reinforcement, original response preferences remained in effect. With the initiation of the arm contingency there were slight elevations in both total arm and leg responses. For Justin (Figure 43c) the only 10-week-old to experience an arm contingency, the arm response remained above leg in all 3 sessions in which the arm contingency was in effect. The gradual acceleration of the arm and concomitant deceleration the leg were clear in the first session. By the third session a classic habituation pattern was obtained.

16-week-olds. Summary curves for 16-week-old subjects are presented in Figure 44 Chris L. (Figure 44a)exhibited a greater arm response per minute in 4 out of 6 arm contingency sessions. As with Justin acceleration of arm response and differentiation of arm and leg response was apparent within the first session. This differentiation was evident in the second baseline session (#8 on the graph). When the leg contingency was in effect there was a deceleration of the arm response and slight elevation of the leg response but not enough to

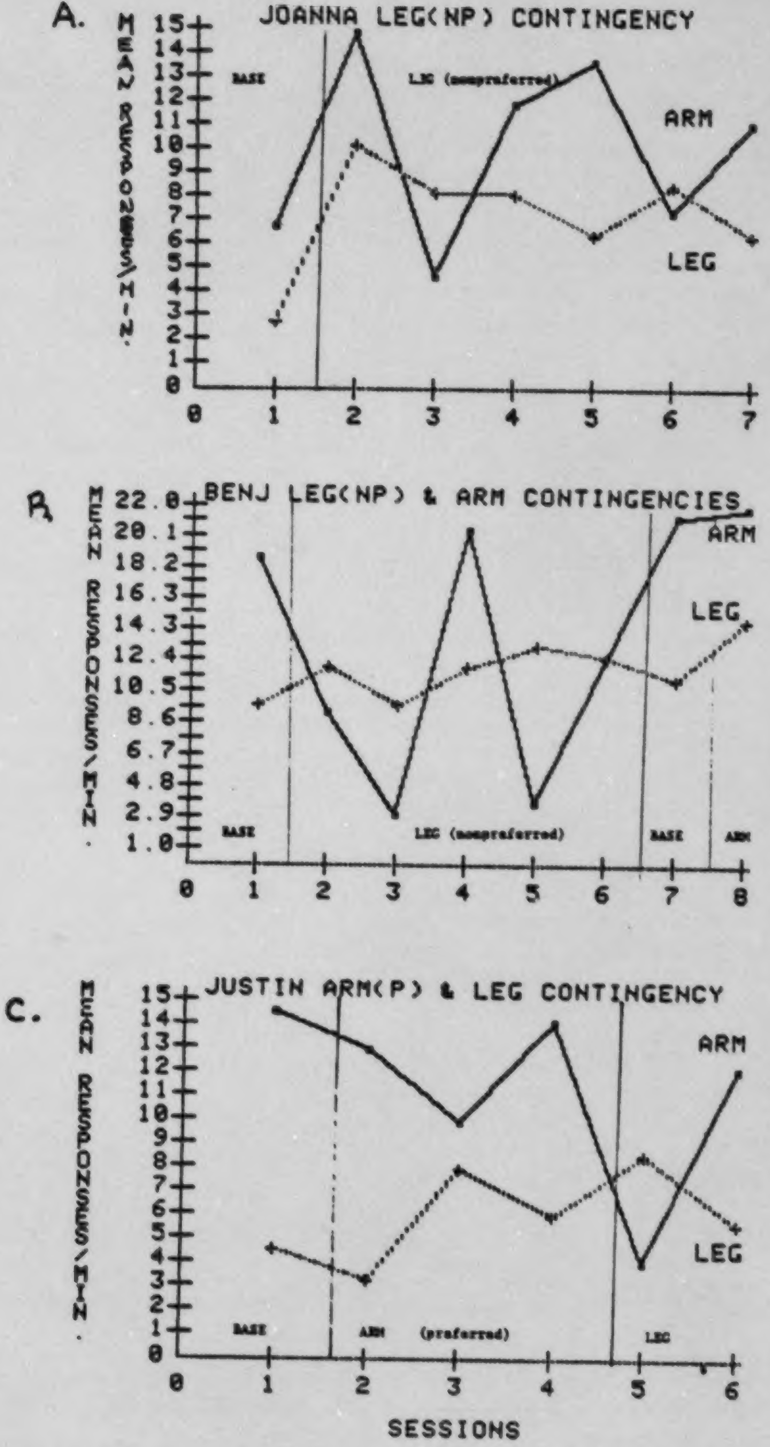


Figure 43. Summary of contingency learning in 10-week-old infants.

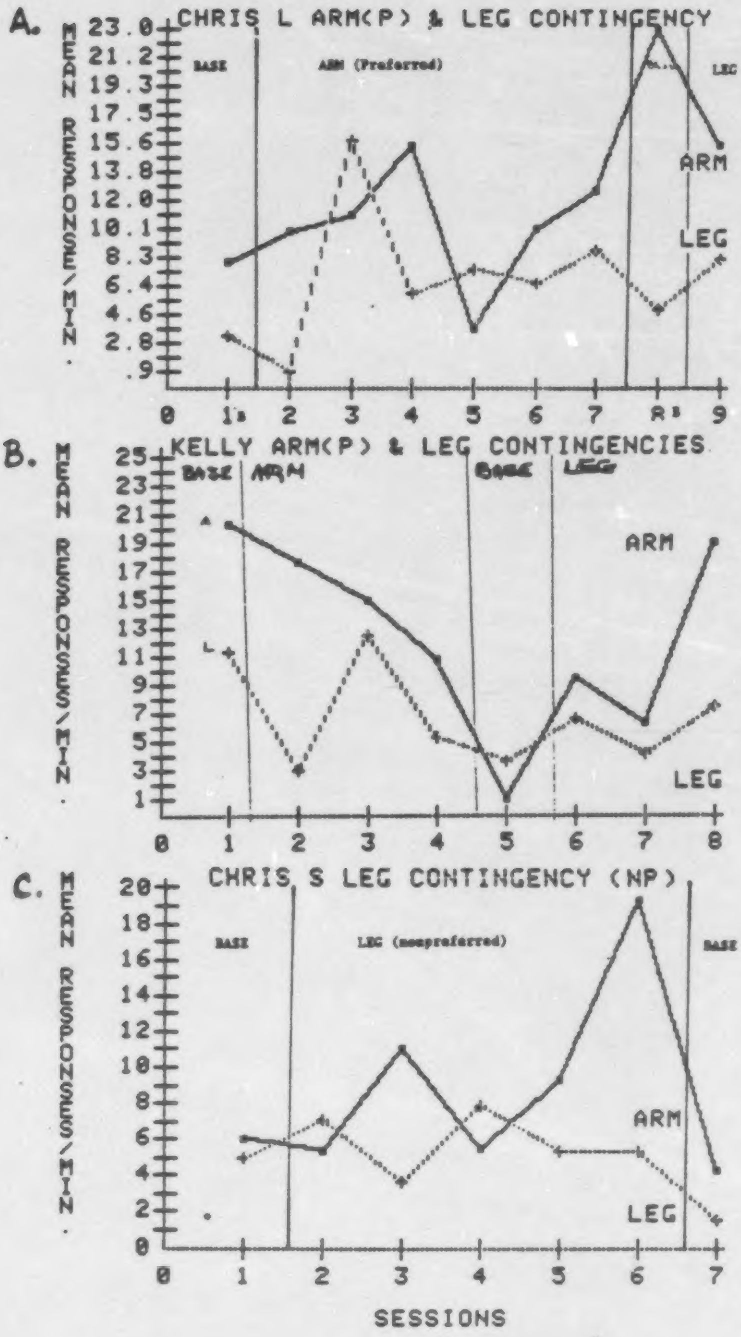


Figure 44. Summary of contingency sessions in 16-week-old infants

reverse the original preference. Kelly also exhibited immediate acceleration of her arm response within the first session and deceleration of the leg response. In the summary graph, (Figure 44b) the elevation of mean arm responses/minute appears to decline over successive arm contingency sessions. This is because no within session reinforcer changes were instituted for Kelly during the three arm contingency sessions and so indicates habituation. In the initial session, Kelly was unwilling to respond in the session for more than 3 minutes. By the third session however, she appeared to enjoy herself and responded for the entire 14 minutes. In this session, a tape of a folk ballad was the reinforcer rather than the Choo-Choo. Neither arm nor leg responses were differentiated during the second baseline and in the subsequent two leg contingency sessions. By the third leg contingency session, an acceleration of arm response was evident. Christopher S. was the only 16-week-old who received a leg contingency. His mean responses/minute (Figure 44c) show either no differentiation between arm and leg or an acceleration of arm responses. There was no evidence of learning the leg contingency.

24-week-olds. Karen exhibited immediate and clear differentiation of arm and leg within the first arm contingency session. She also showed some interesting reinforcement preferences. Like Kelly, she seemed to find the Choo-Choo aversive. Eric exhibited a similar pattern although his initial session was terminated after just 3 minutes because of fussing. By the second session, he remained in the apparatus the entire 14 minute period and consistently responded with his arm to several different reinforcers. During this initial leg contingency experience, leg responses were elevated compared to earlier sessions. However, examination of response pattern within session revealed no consistent pattern within the session. Sandy was quite fussy in the initial two leg-contingency sessions which may have also been reaction to the train. By session three, utilizing the computer to deliver a reinforcer smorgasbord, she was interested enough to remain in the procedure for 14 minutes. She exhibited no real reinforcer preference in this session in which the train was not used. There was no evidence for learning the leg contingency over the next three sessions. In the last session an arm contingency was in effect. The leg response was observed to drop out almost entirely although the arm response failed to accelerate.

Implications

In this study several interesting findings emerged which were totally unexpected. First, some subjects particularly 24-week-olds, appeared to have strong like/dislike reactions to the initial reinforcer (the Choo-Choo). Several of the infants would not tolerate it, probably because of its rather loud volume. Such infants subsequently did well with one of several other reinforcers which generally tended to be subtler, quieter types of stimuli (a vibrating wick lamp, tapes of ballads or classical music, a vibrator). The computer, by instituting within session changes in reinforcement enabled us to assess these stimulus reactions directly in several of the infants. Moveover, the ability of the system to provide many types of reinforcers is clearly an asset in light of such individual preferences. Second, it appears that a leg contingency is a rather difficult problem for infants to learn. There was no evidence of its mastery that rivaled that observed for the arm contingency. It seemed not to matter whether the leg contingency was presented first or second in the sequence. If anything, younger subjects tended to do better either exhibiting at least one session where acquisition apparently occurred or in which arm responses were inhibited. In both cases however such effects were not maintained over the interval between sessions. Subjects who appeared to be inhibiting their arm responses also tended to fuss more, suggesting that this inactivity was aversive for them.

This last finding is of particular interest because it may reveal a constraint we had not thus far encountered in our multiply handicapped children. Namely, that either because of biology or experience there may be some constraints governing the use of learning of a given contingency. Infants, particularly by 24-weeks of age may have already developed expectancies regarding the type of activity which on their part, or objects which they encounter produce interesting results. The arm lever and strings attached to the child's wrist may have been visually more salient and have a strong tendency to elicit a pulling response in contrast to the leg panel. The latter although it does contact the soles of the infant's feet may not provide the same constant, inescapable somesthetic cue. Infants may lift their feet from the panel's surface at any time whereas the bracelet is constantly about their wrist and the ribbon more likely in their field of vision. Since the foot panel also elicits fewer spontaneous contacts it is less likely to be detected as a means to an end. A leg contingency has been frequently and successfully used by Rovee-Collier and associates with infants as young as those in the present study. However, infants in their investigations are tested prone in their cribs with the reinforcer (a mobile) displayed over head. Interestingly, Rovee-Collier & Gekoski (1979) have reported that the footkick-mobile contingency is not an effective learning context after about 14 weeks, a fact which they attribute to the infant's newly developed ability to roll over. However, Sullivan (1982b) has noted that if the mobile is initially made contingent upon armpulls or if it is switched from leg to arm at this age the response may be successfully maintained until well past 6 months.

The results bear directly on our assessments of learning of handicapped infants and the intervention curricula. They suggest that, for infants who have at least some visual capacity and mobility in the upper body, it is best to start with an arm response. To enhance subsequent learning of a leg contingency it may be necessary to 1) render the foot panel more salient, perhaps by removing the distracting arm lever from the apparatus, 2) use a novel reinforcer and/or posture (e.g. a different chair) thereby reducing the number of contextual cues previously associated with an arm response, and 3) simultaneously reinforce inhibition of arm responses. Such strategies may be employed singlely or in conjunction with one another depending on the child. In any event the leg contingency within the current apparatus design appears to represent a more difficult problem. Infants who master this contingency, may therefore be demonstrating an extra amount of resourcefullness if not competence.

The Interface between the Contingency Research Project and the Intervention Unit

The results of these studies are being used to further our contingency research with both handicapped and at-risk infants. For example, the first contingency study (Contingency Learning in 10-Week-Old Infants) led to an extension of this study with at-risk (premature) infants. Results from these studies are directly relevant to the Contingency-Intervention Project and were used to assist in the design and refinement of contingency intervention procedures.

A new study (Study 6) was designed to address the issue of comparability of learning patterns between handicapped and nonhandicapped infants. In this study, nonhandicapped infants received contingency experience over a period of three weeks, with two laboratory visits per week. Infants were tested at three different age levels - 10 weeks, 16 weeks, and 24 weeks. Results from this study can be used to compare patterns of learning among individuals and handicapped and nonhandicapped groups and has served to indicate varying degrees of difficulty in contingency problems for nonhandicapped subjects as well as individual variability in the way such subjects respond to the contingency situation.

Accomplishments to Date

We originally identified three issues for which empirical data were needed with a normal sample before empirical work can begin with handicapped infants. Research on the relationship of contingency experience to affective and state changes, the issue investigated first, was conducted with normal infants in order to determine the efficacy of various methodologies to examine developmental trends and to obtain baseline data. Then, a successful methodology was used to test handicapped and at-risk infants whose responses can be ultimately compared with the normative data. Naturally, before administering the tasks to the handicapped infants, it is determined which responses are available to the child.

The specific objectives that have been met include:

(1) the completion of a review of the literature;

(2) the selection of specific designs for the issues of most relevance to the Contingency Intervention Project;

(3) the building of equipment for these studies;

(4) the pretesting of equipment and procedures;

(5) the completion of Study 1 (design, equipment built, pretest, reliability, data collection, coding, and data analysis);

(6) the completion of Study 2 (design, equipment built, pretest, reliability, data collection, coding, and data analysis);

(7) the completion of Study 3 (design, equipment built, pretest, reliability, data collection, coding, and data analysis);

(8) the data collection and preliminary analysis of Study 4;

(9) the data collection and preliminary analysis of Study 5;

(10) the completion of data collection and preliminary analysis of Study 6;

(11) identification of measurement issues and procedures;

(12) use of measurement information in Contingency Intervention Project;

(13) the preparation of papers on the results of Studies 1, 2, 3 and 4;

(14) drafts of papers for Studies 5 and 6;

(15) analysis of the implications of Studies 1 through 6 for the Contingency Intervention Project.

2. Infant Attention Project

Overview

The study of attention in infants has a long history, as the work by Darwin (1897), James (1890), and Preyer (1888) attest. However, the study of attention generated little interest in this country until the last decade. The exciting work of Fantz (1956, 1958, 1961) and the Russians (e.g., Razran, 1961) provided the first empirical evidence that the infant's sensory world was not, as James had suggested, "a blooming, buzzing confusion".

The recent work on attention has focused on at least five areas. First, attention has been defined more precisely through physiological and behavioral observations and measures. For example, receptor orientation (Fantz, 1965; Lewis, Kagan & Kalafat, 1966), decreases in vocalization and sucking (Haith, Kessen & Collins, 1969; Kaye, 1966; Lewis & Goldberg, 1969), and specific autonomic nervous system changes such as heart rate decreases (Graham & Clifton, 1966; Lacey, 1967; Lewis, Kagan & Campbell, 1966) have all been studied. Second, the belief that attention is the precursor of intellectual development and the growth of mental structures has led many researchers to study attentional processes (see Lewis, 1971, 1973 for a discussion of this issue). Third, attention has been studied as a measure of CNS function and dysfunction. Many different abnormal populations have been studied to see whether attention is a good predictor of dysfunction -- for example, premature infants (Zarin-Ackerman, Lewis & Driscoll, 1975a, 1975b), infants with low Apgar ratings (Lewis, Bartels, Campbell & Goldberg, 1967), and infants with labor-induced medication (Krogman, Brackbill, Conway & Steinschneider, 1970). Fourth, the relationship of attention to other cognitive skills has been studied -- for example, object permanence, concept formation, and intelligence (e.g. Lewis, 1967; Lewis & Goldberg, 1969). In these studies, attention has been shown to be a better predictor than early intelligence test scores or later intelligence test scores. Fifth, like object permanence, attention has been studied and related to more social skills, such as fear of the strange (Lewis & Brooks, 1974) and mother-infant interaction (Hunt, 1960; Lewis & Goldberg, 1969; Provence & Lipton, 1962).

Visual preferences and recognition memory have been studied in Down's Syndrome infants by Miranda and Fantz (1973, 1974). In their 1973 study of 8-month-old retardates, the handicapped children looked longer at the visual stimuli than the nonhandicapped children but showed much less selective visual attention, a finding which may indicate that these infants require more experience to process visual information or that their ability to discriminate visual input is not as well developed as that of normals. In the 1974 study, Down's Syndrome infants were compared to normals in terms of preference for novel visual stimuli. Again, the handicapped infants spent more time looking than normals; however, they showed less novelty preference. The data of both of the Miranda and Fantz studies are suggestive of a deficit in information processing in Down's Syndrome children which will manifest itself in different ways at different points in development.

The Infant Attention Projects involve an in-depth look at various methodology for assessing infant attention, developmental changes in attention, and the prediction of cognitive functioning from early attention. Specific aims include:

1) studying the developmental course of performance on habituation tasks;

2) assessing the reliability of habituation tasks;

3) examining the sensitivity of habituation tasks as a predictor of later cognitive abilities; and

4) examining the relationship between attention and intellectual handicap.

Several studies were conducted, which are described below:

Comparison of Fixed Trial Number and Criterion Techniques in Habituation Assessment

Rationale

The habituation paradigm has been widely used in the study of infant visual attention and memory. One aspect of the visual habituation paradigm which has been varied by researchers is the number of times that the standard stimulus is presented. Some studies have employed a fixed number of trials for all infants regardless of the presence or absence of looking decrement within that number of trials. Others have repeated the standard until a criterion amount of decrement has been reached.

With the availability of two techniques, the question arises as to the relative usefulness of each. A possible criticism of the fixed trial method is that all infants may not be able to adequately process visual information in the same number of trials. If adequate processing time is not provided, then a failure to show either habituation or response recovery to a novel stimulus cannot be attributed to an inability to do so. The habituation criterion technique was developed to allow for such indivdiual differences in processing time during the habituation portion of the attention task. Studies using this method with very young infants (under 3 months) do show habituation and recovery (Freidman, 1972; Hunter & Ames, 1965; Self & Horowitz, 1979) whereas work using a fixed trial method does not (Wetherford & Cohen, 1973). The habituation criterion assessment, therefore, seems to be the technique of choice for studying attention during the first months of life.

The necessity of examining attention with criterion techniques beyond this time, however, remains an open question. If infants older than 3 months are capable of habituating within a fixed number of trials, the benefits gained by using the criterion method with younger infants may not be as great for the older group.

A second issue in the study has to do with the reliability of the habituation task. If such a task is ultimately to be incorporated into infant assessment batteries, it is important to be sure that differences among infants in performance on the task are due to individual differences in the characteristics of the infants themselves rather than to random fluctuations in factors unrelated to the infant's cognitive capacities. As a step toward resolving this issue, the present study assessed the test-retest reliability of the habituation tasks administered.

In summary, the purpose of the study was to compare the outcomes of fixed trial and habituation criterion assessment in 5- to 6-month-old infants and also to determine the test-retest reliability of such tasks.

Method

Subjects. The 23 normal, full term infants (12 female, 11 male) were 5 to 6 months of age. They were from middle to upper middle class families and all but one of the infants was white.

Stimuli. Two sets of multicolored line stimuli were used. One stimulus was comprised of straight colored lines and one stimulus was comprised of an equal number of curved colored lines. The two sets differed in the number of lines that comprised the stimuli, i.e., the number of lines was uniform within sets and different across sets.

Apparatus. Stimuli were rear-projected on a viewing screen located in the center panel of a three-sided viewing apparatus designed to block out interfering visual stimuli. Fixation was observed through an aperture located at the side of the viewing screen.

Procedure. Each infant was tested on two habituation tasks. The order of task presentation was counterbalanced across infants. The mother was seated with her back to the viewing screen with the infant held at her left shoulder facing the stimulus at a distance of about 20 inches.

Task one involved stimulus presentation under fixed trial conditions. The series consisted of six standard stimulus presentations followed by one novel trial. Each presentation and intertrial interval was 30 seconds in length.

Task two was presented under habituation criterion conditions. Infants were required to respond across three successive trials at an average of 50% less than responding on the first three trials. In this portion of the study, stimulus presentation was manually controlled. Through the use of a hand calculator, the observer determined when criterion had been reached and presented the novel stimulus at the appropriate time.

Results

Habituation and recovery were observed in 5- to 6-month-old infants when assessed with either the fixed trial (FT) or the habituation criterion (HC) technique. The group means for absolute decreases in looking as well as for habituation scores are seen in Table 18 . The HC method produces greater decrement scores than the FT technique (F (1, 22) = 4.38; $p < .05$) and also produces less variability among scores.

Table 19 presents the recovery scores and absolute increases for the HC and FT assessments. As with the habituation scores, the HC technique shows greater sensitivity to recovery phenomena than the FT method. Repeated measures AVOVAs revealed no effect of task order on amount of decrease but a significant recovery effect. Greater recovery was demonstrated during the second habituation task administered.

Table 18

Group means for percentage and absolute decrement scores for HC and FT assessment.

	TECHNIQUE	
MEASURE	HABITUATION CRITERION	FIXED TRIAL
Absolute Decrement $[\bar{X}_{S_{1+2+3}} - \bar{X}_{S_{n-2+n-1+n}}]$	5.88 seconds (1.33 - 10.66)	5.60 seconds (0.50 - 17.67)
Percentage Decrement $\left[\frac{\bar{X}_{S_{1+2+3}} - \bar{X}_{S_{n-2+n-1+n}}}{\bar{X}_{S_{1+2+3}}}\right]$	.61 seconds (0.50 - 0.78)	.40 seconds (0.08 - 0.71)

Table 19

Group means for percentage and absolute recovery scores for HC and FT assessment

	TECHNIQUE	
MEASURE	HABITUATION CRITERION	FIXED TRIAL
Percentage Recovery $\left[\frac{\text{Novel - Standard}_n}{\text{Standard}_n}\right]$	153%	125%
Absolute Recovery [Novel - Last Standard]	4.26	6.0

Results from the HC assessment indicate that criterion was reached in an average of 7.68 standard stimulus presentation trials. In a comparison of performance on the two task types, it was found that most 5- to 6-month-olds showed a 30% to 40% decrease in looking time by the sixth standard stimulus trial on both the FT and the HC task. This similarity in the outcomes of the two attention assessments suggests that test-retest reliability does exist for habituation assessment as does the fact that a significant positive correlation exists between the habituation scores for the two tasks ($r = .41$; $p < .05$). Thus, infants who habituated the most on the FT task also habituated the most on the HC task.

No significant relationships were found between the amount of decrement and recovery for either task or between the number of trials to criterion or any other variable. In addition, recovery scores on one task were not found to be related to recovery scores on the other.

Implications

In summary, results indicated that 5- to 6-month-old infants show habituation and recovery when assessed with either the fixed trial or the habituation criterion technique. Habituation criterion assessment produced less variability among decrement scores as well as significantly greater habituation and recovery than the fixed trial method and findings from the two methods were related in that a significant correlation was found between the amounts of response decrease demonstrated on each task by each infant. The two tasks were therefore found to be similar in that they both indicate habituation and recovery in 5-6-month old infants.

Perhaps the most important finding of this work is an initial confirmation of the test-retest reliability of habituation assessment. This is an important first step if attention measurement is to be included in infant assessment batteries. It indicates that the measure is indeed tapping into an organized capacity of the young infant. Further research is needed for replication of this finding as well as for determining whether test-retest reliability is shown by non-normal infant populations as well.

The theoretical and functional significance of the greater sensitivity of the HC over the FT technique in eliciting more decrement and recovery in response to standard and novel stimuli remains to be determined.

Accomplishments to Date

The current study was designed, conducted, and analyzed. A paper has been submitted for publication.

Visual Attention in Premature Infants: Preliminary Report on the Effects of Stimulus and Risk Status

Rationale

A considerable body of research has suggested that an infant's capacity to habituate to a redundant visual stimulus may relate to later perceptual and cognitive functioning (Lewis, 1971; Lewis et al., 1966; Lewis & Baldine, 1979; McCall, 1971). For this reason, the early assessment of visual attention has been studied as a means of early detection for high-risk status among various groups of infants who are thought to develop cognitive difficulties later in life (Fox & Lewis, in press; Kopp et al., 1974; Miranda, 1976; Sigman et al., 1973; Sigman & Parmelee, 1974). The purpose of the following report is to present preliminary data on the assessment of visual attention in a group of pre-term infants and compare their responses to a sample of healthy term infants.

Method

As part of the comprehensive 3-month assessment battery, 24 preterm infants (12 male, 12 female; mean gestational age = 32.7 weeks; mean birth weight = 1722 grams) and 24 healthy term infants (matched with the preterm sample on sex, birth order, and SES) were tested on a visual attention task. Infants were placed in an infant seat 1 meter from a rear projection screen where visual stimuli 24 centimeters square were projected from a Kodak carousel slide projector. Infant visual attention was recorded by an observer (in reliability check, by two observers) stationed behind the projection screen. Duration of visual fixation was recorded whenever the observer judged the corneal reflection of light from the slide to be present on the infant's eyes. Visual fixation was recorded onto a Vetter FM instrumentation recorder by means of Coulburn digital logic and was also recorded on paper via a Grass Model 7 Polygraph.

Each infant saw two sets of slides: social (cartoon characters of a man, woman, and child) and non-social (geometric patterns). Each set of slides consisted of six presentations of an identical slide (each presentation 20 seconds in length with a random intertrial interval of 15 to 20 seconds) followed by one transformation slide presented on the seventh trial. The transformation in the social set was one of color, i.e., from chromatic to black and white, while the transformation in the non-social set was one of geometric pattern, i.e., from straight to curved lines. The order in which the two sets of slides were presented was identical across all subjects with a 4 to 5 minute break between sets. Babies who fretted during a session were re-tested later in the same day or asked to return on a subsequent day for re-testing.

Results

Visual fixation data has been analyzed using both total fixation time in seconds-per-trial and also length in seconds of the first fixation per trial. Initial findings include the following: (1) control subjects show marked habituation to the six redundant presentations of the non-social stimulus followed by a pronounced response recovery on the novel seventh trial. Similarly, controls also habituated to the social stimulus, showing an overall response decrement across the first six trials followed by at least some recovery on the seventh trial; and (2) on the other hand, premature subjects clearly habituate to the redundant social stimulus but show no recovery to the novel seventh trial. Prematures also habituate to the non-social stimulus across the first six trials, demonstrating marked response recovery to the non-social transformation.

Implications

These preliminary results suggest that non-social stimuli possess a greater salience for the premature subjects than do the social stimuli; while the same pattern may also characterize the term infants, they appear to show more fixation to the social stimuli than do the prematures and also to demonstrate more acute visual attention to the social stimuli as their recovery on the novel seventh trial would suggest. It should be noted that among the preterm infants, five subjects did not complete the task in both social and non-social conditions even after a number of attempts at testing. Further examination of this group reveals, post hoc, that they may reasonably be divided into two groups. In the social condition across trials 1 to 6, 13 prematures fixated an average of 8.7 seconds per trial while 6 fixated an average of 2.6 seconds per trial. Again, in the non-social condition, 14 prematures fixated an average of 9.7 seconds per trial while 5 fixated an average of 2.6 seconds per trial. Eleven infants overlapped in the "high fixation" category across both conditions. These two groups of prematures showed (1) a significant different in birthweight but not gestational age, with infants in the "high fixation" group having a mean birthweight of 1555 grams and those in the "low fixation" group having a mean birthweight of 1889 grams; and (2) 5 of the 12 infants who were either in the low fixation group or did not complete the task had "suspect" neurological evaluations in the neonatal period.

Accomplishments to Date

Thus far:

(1) the study was designed;

(2) data collected;

(3) reliability of data collection procedures assessed;

(4) data analyzed; and

(5) papers were presented.

Heart Rate Variability and Attention in Handicapped and Normal Infants

Rationale

Cardiac responses to environmental stimulation have been interpreted by a large number of investigators to be indices of information processing. Lacey (1967) did much of the early work in adults, and reported that the heart rate stabilization was a concomitant of attention to the external environment. Decreases in heart rate variability during tasks requiring continuous attention were also found in several studies of male college students (Hnatiow & Lang, 1965; Lang, Sroufe & Hastings, 1967; Porges & Raskin, 1969). Heart rate variability changes during tasks in adults were not found consistently to decrease, however, which may be due, in part, to the various task requirements of different studies and stimulus conditions.

Heart rate variability changes during stimulation have also been studied in younger subjects (Porges, Arnold & Forbes, 1973; Lewis, Dodd & Harwitz, 1969; Kagan & Roseman, 1964; Porges & Humphrey, 1977). Infants were found to exhibit increases in heart rate variability when gently stimulated, while school-aged children show decreases in tasks demanding attention to the external environment.

Porges and Humphrey (1977) also looked at differences in heart rate variability responses of retarded versus normal children. They found that while variability decreased during a visual attention task in normal children, it increased in the retarded subjects. There is a suggestion in these data that the heart rate variability when attending varies as a function of maturational or CNS differences.

The present study examines the heart rate variability changes accompanying visual attention as a function of age and handicapping condition, using an habituation - recovery paradigm.

Method

Subject. Handicapped sample - 143 handicapped subjects, 83 males and 69 females, ranging in age from 3 to 63 months. The subjects fell into four diagnostic categories, 62 subjects with Down's Syndrome, 21 with physical impairments, 26 with developmental delays and 34 with multiple handicaps. The subjects were recruited through local infant intervention programs.

Normal sample - 60 subjects, 35 males and 25 females, 20 at each of three ages: 3 months, 12 months, and 24 months. The gender and socioeconomic status of the normal subjects were matched to those of the handicapped subjects for each age category. The subjects were recruited for the study through local newspaper advertisements.

Procedure. The subject was seated on his or her caregiver's lap facing a screen enclosed in a three-sided booth. Three Beckman silver chloride electrodes were attached to the subject, one over the sternum, one on the back to the left of the shoulder blade, and one on the hip. The contacts were checked with a Grass Electrode Impedence Meter before testing began.

A series of visual stimuli was presented by a Kodak Carousel Model 650 rear-screen projector. The series consisted of a colorful design of straight lines presented for six consecutive 20 second trials, with 20 second intertrial intervals followed on the seventh trial by a similar design of curved lines presented for 20 seconds.

Measures. Heart rate was recorded on a Grass Model 7 polygraph. Raw EKG data were transformed via a cardiotachometer into beats per minute, which appeared on the polygraph record. The duration of visual fixation was recorded on the polygraph when an observer, watching the subject's face through a peephole beside the screen, depressed a button when the subject's eyes were oriented toward the stimulus. Interrater reliability was .94. The onset and duration of each trial were also automatically recorded on the polygraph.

Heart rate variability was obtained by calculating the difference in rate between the three highest consecutive beats and the three lowest consecutive beats during a 5 second prestimulus baseline, 5 seconds immediately following stimulus onset, and during visual fixation throughout the trial. Only trials in which the subject looked at the stimulus for more than 1.5 seconds were included in the calculations of the measures to help insure than the subject's attention was actually engaged.

Response decrement and recovery scores were calculated for each subject. Response decrement was the difference between the mean heart rate variability for trials 1-3 combined and trials 4-6 combined, divided by the mean for trial 1-3, providing a proportion of response decrement that is unaffected by initial levels of response. Recovery was defined as the difference in heart rate variability on trial 7 and trial 6 divided by the value for trial 6.

Data Analysis

Repeated measures analyses of variance were used to test the differences in heart rate variability that occurred during the base period, stimulus onset and visual fixation for the normal versus handicapped subjects and for each age group.

Results

Heart rate variability was found to increase from a base level during stimulus onset and especially during visual fixation for both the normal and handicapped subjects. Variability during attention to the novel stimulus was also found to be significantly different than during the base for both groups. Polynomial trend analysis of heart rate variability during the base, fixation during trials 1-3, trials 4-6 and trial 7, revealed that only the normal subjects displayed the expected increase, decrease,and increase predicted if response decrement and recovery were occurring, which would imply information processing.

There was, in addition, a significant effect of age. The oldest subjects showed the greatest heart rate variability across trials, while the two younger groups did not differ significantly from one another. Polynomial trend analyses revealed that only the oldest subjects were exhibiting response decrement and recovery.

Accomplishments to Date

The study was completed and a preliminary report of the findings was presented at a conference.

2. Other Research Projects

Overview

Many other Institute Research Projects focus on development in three major developmental domains -- perceptual-cognitive, social-emotional, and communicative-linguistic. All three areas are crucial for development, and all are inter-related in complex ways. In fact, the three have parallel but interactive developmental courses such that intervening in one area will have consequances in the other two (Lewis & Brooks-Gunn, 1979; Lewis & Cherry, 1977).

Some of the recent studies to be presented here were conducted by predoctoral and postdoctoral fellows in the Institute. These projects are:

1) Children's Social Networks - Dr. Miriam Kotsonis;
2) The Development of Response Skills in Normal and Retarded Children - Dr. Jane Leifer;
3) Individual Difference in Toy Play at Two Years of Age - Dr. Linda Michalson;
4) The Contribution of Several Infant Characteristics to Maternal-Infant Interaction at 3 Months - Margaret Bendersky;
5) A Clinical Research Instrument for the Evaluation of Mother-Infant Dyads - Lauren Brandt;
6) The Quality Mother - Infant Attachment Relationships as Related to Social-Emotional Adjustment at School-Age - Carolyn McGuffog;
7) Age as a Social Cognition - Lucille Weistuch;
8) The Effects of Language Workshops on Maternal Expectancy and Language Use with Normal and Down's Syndrome Children - Lucille Weistuch;
9) The Development of Mental Abilities: A Multidimensional Model of Intelligence in Infancy - Mary Enright.

Children's Social Networks

Miriam Kotsonis

Rationale

Child development takes place in a social context. Not only parents, but also siblings, relatives, peer friends and adults interact with the child and, undoubtedly, contribute to the growth of the child's competence. Although the importance of individuals other than the parents has recently been emphasized (e.g., Lewis 1979), little information is available regarding the nature of the child's extended social network. Characteristics of this network, including its size, variety of membership, and frequency of the child's contact with network members, influence the range and types of social relationships which are available to the child.

Network studies have received most research attention in the field of sociology, where the models of interaction in complex social systems have been elaborated (e.g., Buckley, 1967) and quanitative methods for characterizing systems have been developed (Holland & Leinhardt, 1979). There have been few attempts, however, to formalize the broad network of contacts in a child's social system and to understand the developmental functions they might serve.

Lewis and Feiring (1979) have proposed a model of the child's social network which highlights factors influencing the nature both of the persons comprising the network and of the possible social functions they could perform in the child's life. These authors suggest that the social network changes substantially over time, that the structure of the family will influence the patterns of contact available to the child (see also Lewis and Feiring, in press), and that socio-cultural differences will have an impact on social networks.

The present study attempts to describe more precisely the social network of the child at 3 and 6 years and to investigate the hypothesis suggested by Lewis and Feiring (1979); i.e., that the network undergoes substantial change over time, and that family structure and social status will influence the network. In addition, the relationship of network characteristics to the child's intellectual (particularly, verbal) competence will be explored.

Method

For this study, data on the composition of children's social networks, as reported by their mothers, were collected for 117 three-year-olds. Mothers were asked to complete an adapted version of the Pattison Psycho-social Network Inventory (Pattison et al., 1975), on which they listed persons in the child's social network, and specified both the relationship of each person to the child and the frequency of contact with the child. In addition, a cognitive measure (Stanford-Binet) was administered. The sample of children studied varied by sex of child, socio-economic status, and birth order.

These children have been followed for three more years, and data from approximately 100 subjects, now 6 years of age, will be available for the present study. Mothers have again been asked to complete the inventory. Children are also being given a cognitive measure (the Wechsler Preschool and Primary Scales of Intelligence).

Analysis

Data from this study were subjected to several types of analysis. For the purpose of describing the network, detailed breakdowns of types of relationships and frequency of contact were provided for the total sample at each age, as well as for the demographic subgroups of SES, gender of target child, and birth order of child. In addition, demographic groups were compared to investigate differences in network composition due to family and socio-cultural variables. Network structures at 3 and 6 years were compared to each other, in order to determine changes over time.

Results

Results indicated that the child's social network was affected by the variables of birth order and socioeconomic status. First-borns were exposed to more people in general and to a greater number of persons outside the family specifically. Middle-class children were given proportionately more exposure to relatives while upper-middle class children were given proportionately more exposure to non-relatives.

Subject age and gender were also found to have an effect on the child's social network contacts. Three-year-olds were found to come in contact with twice as many adults as children while for six-year-olds the number of adults seen on a regular basis was found to decrease. Additionally, daily contact with peers was found to be greater for six-year-olds than for three-year-olds. Male and female subjects were each found to have a higher number of members of like gender within their respective networks.

Implications

It is expected that this study will increase the information available about the nature of the preschool and early elementary school-aged child's social network. This research also examines the relationships between the social network and the child's gender, SES, birth order, and intellectual competencies. The study thus takes into account and attempts to describe the ecology of the child's social world (cf. Bronfenbrenner, 1979).

Accomplishments to Date

Data has been collected and analyzed. A chapter has been written describing the results of this study.

The Development of Response Skills in Normal and Retarded Children

Jane Leifer

Rationale

Recently, much research has been conducted in order to compare the language-learning process in normal and mentally retarded children. Two major theoretical views have guided this research. The "delay" theory maintains that normal and retarded children follow the same developmental sequence in the growth of linguistic abilities with retarded children simply evidencing a delay in the rate of acquisition. In contrast, the "difference" theory argues that the nature and sequence of language growth differs in normal and retarded populations. The present study compares the development of conversational abilities in normal and retarded children in order to determine whether the acquisition of communicative abilities in retarded children is simply a delayed process or one which is qualitatively different form that found in normal children. In particular, the ability to produce a response in a question-answer exchange is examined.

Method

First, normal and retarded children were matched for chronological age in order to identify any developmental delay in the response abilities of retarded children. Second, in order to control for any identified language delay, normal and retarded children were matched for language level at the one-word stage of language ability and their conversational abilities were compared. Given such a control, the delay theory would predict that normal and retarded children would demonstrate similar conversational abilities when equated for language level.

Subjects and Procedure

Twelve children served as subjects. Four normal children with an MLU of 1.0-1.5 at ages 18-23 months were matched with four retarded children at the same age (18-23 months) and with four retarded children at the same language level (MLU 1.0-1.5). All retarded children were diagnosed as having Down's Syndrome. Mother-child interactions were collected during half hour free play sessions in a laboratory playroom. All interactions were videotaped and transcriptions were made of all utterances. Maternal-questions and child-responses were then coded according to rules outlined in a prepared coding manual.

Data Analysis

A comparison of normal and retarded children at ages 18-23 months indicated that retarded children were substantially delayed in the acquisition of conversational abilities. While the normal children were already beginning to respond appropriately to their mothers' questions (mean = 15% appropriate responses), the retarded children rarely produced contingent responses (mean - 3% appropriate responses). However, when normal and retarded children at the same language level were compared, the conversational abilities of both groups were still found to differ. While normal children at the one-word stage responded appropriately to questions 15% of the time, the retarded children at the one-word stage produced appropriate responses 30% of the time. Even an examination of inappropriate responses by normal and retarded children indicated more advanced conversational abilities on the part of the retarded children. Inappropiate responses by normal children typically consisted of a failure to produce any responsive behavior at all following maternal questions. In contrast, inappropriate responses by the retarded children usually consisted of a verbal response which immediately followed the mother's question, however, this response was not appropriately related to the question asked. Nonetheless, these verbal responses following maternal questions suggested that the retarded children at the one-word stage had already acquired basic conversational turn-taking abilities and were aware that questions require a contingent verbal response.

Implications

These results provide support for the difference hypothesis in that they demonstrate that the development of conversational and general linguistic abilities follow different developmental courses in normal and retarded children. At the one-word stage of syntactic development, retarded children have already acquired specific response abilities while normal children have fewer such response skills at this stage. For the retarded children, the development of early responses skills appears simultaneously with the development of early one-word sytactic skills. However, for the normal children, the development of these same conversational skills awaits the further development of more complex syntactic and general linguistic abilities. These findings also have important implications for both researchers and specific educators as they suggest that professionals may underestimate the communicative potential of retarded children by relying on broad measures of language level rather than evaluating conversational skills of these children, skills which appear to develop more rapidly relative to other general linguistic abilities.

Accomplishments to Date

Data has been collected, coded, and analyzed. The results of the study have been presented at professional meetings and a manuscript has been prepared and submitted for publication.

Individual Differences in Toy Play at Two Years of Age

Linda Michalson

Rationale

The importance of children's exploratory and play behavior to healthy social, emotional, and cognitive development is apparent. The development of self and object permanence, imitative learning processes, and sensor-motor intelligence all have their origins in the infant's playful interactions with the environment. To date, however, few studies have attempted to describe empirically the critical dimensions underlying children's play with toys.

Individual differences in children's toy play during the first two years of life have been found in some studies. Boys have been found to play more with mechanical and manipulative toys while girls tend to play more with "cuddly toys" such as stuffed animals (Bronson, 1971; Goldberg & Lewis, 1969; Jacklin, Maccoby, & Dick, 1973). At least one study, however, failed to confirm this finding in a lower class sample (Messer & Lewis, 1972). Although McCall (1974) found that boys manipulated toys with greater "sound potential" and possibly more plasticity than did girls, he was unable to replicate this result. Birth order differences in toy play, on the other hand, do not seem to be as frequently explored or reported as are sex differences. Collard (1968) found that firstborn and widely spaced infants showed fewer responses and more distress in the presence of a new toy than did laterborn infants.

What are the possible sources of these individual differences in toy play? It has been suggested that physical characteristics and novelty of the environment govern exploratory behavior. In fact, toys that offer the most varied possibilities for manipulation have been shown to receive more attention from children (Goldberg & Lewis, 1969; Jacklin et al., 1973). Several other studies have reported that infants show more interest in novel toys than familiar ones (Collard & Rydberg, 1972; Hutt, 1967). Others, however, have failed to find more manipulative contact of novel toys (Cox & Campbell, 1968; McCall, 1974).

It may be that complexity and novelty per se do not govern toy play but that other factors are involved in and contribute to individual differences in toy play. For example, little is known about the effects of the toys the parents give the child at home on the child's behavior outside the home. Does having a toy at home affect the frequency with which it is played outside the home? How is children's play with toys affected by the presence of a favorite toy?

The intent of the current research was to determine the nature of individual differences in toy play in terms of sex, socioeconomic status, and birth order. After determining the extent of individual differences the study examined possible sources of these differences by looking at which toys the children had at home, the effects of a favorite toy on toy play, and the effects of a toy's complexity on toy play.

Method

Subjects. The sample consisted of 155 2-year-old children who had been participating in a longitudinal study of cognitive and social development. Of these subjects 73 were boys, 82 were girls, 51 were firstborns, 104 were laterborns, 74 were higher SES, and 81 were lower SES.

Procedure. At 2 years of age each child was observed during a 15-minute play session in a laboratory room designed to look like a playroom at home. The room contained toys, furniture, magazines, and pictures on the walls. The toys included a truck, a set of wood blocks, a rubber ball, two toy guns and a holster, a toy piano, Barbie and Ken dolls, a "popper", a teddy bear, a blackboard with chalk, and a puzzle box.

The play session began with the mother seated in a chair with the child on her lap. On signal (two knocks on the one-way mirror) she placed the child on the floor. To keep the situation as natural as possible, the mother was instructed to act however the child would expect her to act at home. The only specific request was that she remain in the room for the entire 15 minutes. Afterwards, the mother was asked which toys the child had at home that were in the laboratory playroom and whether any of the playroom toys could be considered the child's favorite toy at home.

Measures. The number of 15-second intervals the child played with each toy was coded from videotapes of the play sessions. Play was defined as the physical manipulation of a toy, including holding it, exploring it, showing it to the mother, and/or sharing it with the mother.

Based on the mothers' reports of the toys the child had at home, the toys in the playroom were coded for each subject as either "familiar" (if the child had the toy at home) or "unfamiliar/novel" (if the child did not have the toy at home). The toys were also coded for each subject as "favorite" (if it was the child's favorite toy at home) or "not favorite".

Finally, the complexity of each toy was determined by asking 13 psychologists to rank the 10 toys along a dimension of complexity. A rank for each toy was computed based on the means of the psychologists' ranks.

Results

Striking sex differences were found in the types of toys the children chose to play with. Boys played more with the guns, truck, and ball than did the girls, who played more with the teddy bear. Although no social class differences in toy play were found, one birth order difference appeared: firstborn children played more with the blackboard and chalk than did laterborn children.

To explore the possible causes of these differences analyses were conducted to look at the effects on playtime of the following variables: the toy's familiarity, the toy's status as favorite/not favorite, and the toy's complexity. Although there were no group differences in the number of toys the children had at home, there were interesting individual differences in which toys they had. More boys than girls had guns and blocks at home, while more girls had dolls. The toy piano was more familiar to children in the upper SES group. Finally, more laterborns than firstborns had guns, dolls, and blackboards at home.

The analysis on the effects of familiarity showed that children who had toy guns and puzzles at home were more likely to play with these toys in the playroom than children who did not. In contrast, the popper was more likely to be played with by children for whom it was novel.

The effects of favorite toys on toy play was also interesting. First, based on the mother's reports of their child's favorite toys, the favorite toys of the boys seemed to be the truck and the ball, whereas the dolls, the teddy bear, the popper, the piano, and the blackboard were the girls' favorite toys. More upper SES children than lower SES children had the piano and toy guns as favorite toys. Finally, the teddy bear was more often a favorite toy of laterborns than firstborns.

The status of favorite toy had a dramatic effect on the frequency with which the children played with different toys. For all toys, except the blocks and dolls, the children played more with those that were their favorite toys at home than did children for whom the toy was not a favorite.

Interestingly, the more complex a playroom toy was the fewer was the number of children who had the toy at home. This was the case for both boys and girls as well as for the sample as a whole. However, the frequency of toy play in the playroom was directly related to the complexity of the toy: the more complex the toy was, the more time the child spent playing with it.

Implications

This study on individual differences in toy play suggests that sex role stereotypes in children's play can already be detected by the time children are 2 years old. The boys preferred to play with guns, trucks, and balls; the girls chose the cuddly teddy bear. These results confirm research findings reported elsewhere in the literature.

The results showed that children's play behavior is related to the type of toys the parents give the children at home. It appears that parents buy different toys for boys and girls: more boys than girls had guns and blocks at home, and more girls had dolls. In the playroom the children were found to play more with the guns and puzzle if they had these toys at home. The toys that had become the children's favorite toys at home were played with more even when there were novel toys to be explored. Rather than novelty, the complexity of the toy seemed to be more salient factor in affecting toy play.

In general, few social class or birth order differences in toy play were observed.

Accomplishments to Date

A review of the literature has been completed and the data has been analyzed. A manuscript has been prepared for submission to a journal.

The Contribution of Several Infant Characteristics to Maternal-Infant Interaction at 3 Months

Margaret Bendersky

Rationale

Researchers in child development have long been interested in the problem of the prediction of developmental outcome. The theoretically optimal situation would be the ability to predict adult functional status at birth. This would be especially valuable in the identification of infants who would develop abnormally, allowing the provision of intervention programs which might facilitate more normal developmental courses. Thus far, efforts to predict developmental outcome from early infancy have been minimally successful.

Recent theories have focused on the importance to development of organism-environment interactions over time, rather than static characteristics of the organism (Lewis, 1972; Sameroff and Chandler, 1975). Evidence suggests that one of the most important components of the infant's environment is his/her caregiver. Sigman and Parmelee (1979) for example, found that their cumulative risk index for the longitudinal evaluation of preterm infants, had to include measures of caregiver-infant interaction at 8 months in order to successfully differentiate high- and low-risk groups of children at 2 years of age.

A number of studies have examined the mother-infant interaction in attempts to define the specific features of this aspect of the child's environment which have the greatest impact on development. Maternal interaction patterns, such as her responsivity to the behavior of the infant and particular responses to specific infant behaviors have been found to correlate with indices of infant functioning (Lewis & Coates, 1980; Gallas & Lewis, 1977; Lewis & Goldberg, 1969). Other studies have supported the hypothesis that characteristics of the infant, such as sex, prematurity and health status, differentially affect the caregiving evnironment (Field, 1979; Beckwith, 1976; Lewis & Freedle, 1973; Lewis, 1972).

The present study is designed to examine the relationship between three infant characteristics and maternal-infant interactions when the infant is 3 months of age. Two of the characteristics are present at birth - the health status and gestational status of the infant. The third variable is visual attention at 3 months, which is assumed to reflect central nervous system functioning. Several characteristics of the maternal-infant relationship will be examined. Of particular interest are the more interactive aspects, especially the contingency of maternal responsibility.

Method

Subjects: This study will use 79 subjects who have been recruited from among the babies born at Roosevelt Hospital in New York City as part of the Identification Study of the Institute's Detection Unit. Seventeen of the subjects are sick prematures, 14 are healthy prematures, 20 are sick fullterm and 28 are healthy fullterm infants.

Measures: Visual attention was assessed at approximately 3 months of age at the laboratory at the Institute at Roosevelt Hospital. The subjects were presented with series of slides of geometric forms, and drawings of people. Each series consisted of six presentations of the same slide followed by a novel stimulus, a transformation of the repeated slide, on the seventh trial. Number of visual fixations, total fixation time and length of first fixation were recorded for each trial.

Mother-infant interaction was assessed by videotaping 20-minute unstructured play sessions, in a comfortable room with toys at Roosevelt Hospital. The tapes were then coded according to a scale developed by Lewis and Lee-Painter (1974). Every 10 seconds, 13 maternal and 13 infant behaviors were coded for both occurance and whether the behavior occurred in response or was an initiation.

Data Analysis

Analyses of variance were used to determine whether maturity and health status at birth, gender or birth order had an effect upon the infant's total fixation across trials 1-7, total fixation on trials 1 and 2 alone, response decrement or response recovery scores in the social stimulus and the nonsocial stimulus conditions. Cluster analyses were preformed on the total fixation across trials in the social and nonsocial stimulus conditions in order to see if subjects could be assigned to four discrete patterns of fixation for each stimulus type and to further describe any group differences.

Multivariate analyses of variance were preformed using a variety of maternal and infant stimulation and responsivity measures as dependent variables, and health, maturity, gender, birth order and visual attention cluster the membership independent variables.

Summary

The visual attention analyses revealed very few group differences. There was stimulus type difference however. For nonsocial stimuli, a significant trials effect confirmed that the subjects' attention decreased over the 6 redundant trials and then increased on trial 7. There was no significant difference across trials in attention to the social stimuli.

Maturity at birth had a significant effect upon maternal stimulation, such than fullterm infants received more proximal stimulation and preterms more distal. Health status had a significant effect upon maternal responsivity. The mothers of sick infants showed more physical contact in response to the behavior of their infants than mothers of healthy infants. These factors interacted with one another as well as birth order and gender in affecting maternal behaviors. There were virtually no group differences in infant behavior found. One of the nonsocial visual attention clusters, the pattern of least attention, was associated with the least maternal proximal stimulation, and the greatest maternal distal stimulation, as well as the least kinesthetic stimulation.

Accomplishments to Date

The review of the relevant literature has been completed. The statistical analysis have been performed, and the results of this study have been written up in the form of a dissertation.

A Clinical Research Instrument for the Evaluation of Mother-Infant Dyads

Lauren Brandt

Rationale

A major challenge for researcher investigating the functional significance of mother-infant transactions has been the development of interactionalist conceptual models that allow for a thoroughgoing quantification of complex series of dyadic behavior (Lewis & Lee-Painter, 1974; Osofsky & Conors, 1979; Stern, 1974). Lewis and Lee-Painter (1974) proposed one such model for describing complex sequences of interaction between the infant and its caregiver that utilizes four levels of analysis. The simplest level examines the frequency distribution of discrete behaviors that are coded from an a priori list of commonplace mother and infant activities. The second level, simultaneous behavior analysis, examines the number of times maternal and infant behavior occurs within the same predetermined time period. The third level, directional-interactive analysis, captures the occurrence of simultaneous behavior plus the flow of direction for those behaviors as well. Finally, a sequential analysis constructs Markov sequences for the transitional probability of particular streams of ongoing events. While this approach has been successful in quantifying behavioral differences among mother-infant pairs, the perplexing difficulty remains that analyses of behavioral checklist data, however, thorough they may be, lack an intuitive feel for the qualitative differences among dyads, For this reason, a more clinically-oriented research instrument was developed to assess Qualitative aspects of the mother-infant interaction in conjunction with the Lewis and Lee-Painter procedure.

Method

Categories. Ten evaluative categories for the assessment of mother-infant interaction were chosen on the basis of their predominace in developmental research and clinical theory (Fox et al., 1979). For each category, a five point ordinal scale was devised so that each quality of mother-infant interaction could be rated along a range from "optimal" at the positive end to "disruptive" or "disorganizing" on the negative end. The scales allow for a dyad to be evaluated for:

1) teaching style, i.e., howe well do the mother's efforts to reach her infant about various aspects of the environment match the infant's actual interests and competencies.

2) affective tone, i.e., what is the overall emotional climate of the interaction.

3) comforting style, i.e., given a particular infant's need for security and reassurance, how well does the mother provide it?

4) maternal expectations of infant's cognitive competence, i.e., what are the mother's apparent assumptions concerning the cognitive skills of her infant? How appropriately do they match the infant's apparent level of development?

5) maternal expectations of infant's affective needs and competencies, i.e., how appropriate are the mother's apparent expectations and assumptions concerning infant's emotional development.

6) mutual regard, i.e., a straightforward assessment of the relative presence or absence of prolonged periods of gaze interaction.

7) vocal interaction, i.e., what is the extent to which the interaction between mother and infant is carried by vocal channels of communication?

8) integration, i.e., to what extent do mother and infant seem to be "in tune" with each other? In a global sense, what is the quality of their mutual engagement? To what extent are the two members of the dyad caught up in reciprocally regulated patterns of mutual give and take?

9) cognitive autonomy, i.e., to what extent do mother and infant seem able to let the other "think for him or her self?"

10) affective autonomy, i.e., to what extent do mother and infant allow each other to have independent emotional experiences?

Subjects. Ten videotapes of mothers and their 12-month-olds previously analyzed with the Lewis and Lee-Painter method were viewed by two observers. Each mother-infant dyad was assessed using the evaluative scales described above. Inter-rater reliability was computed for each category and the observers' judments for the 10 dyads were intercorrelated with the data from the Lewis and Lee-Painter analysis.

Results

The results of this analysis provide interesting insights into a clinical-qualitative evaluation of mother-infant interaction and its relation to behavior. For example, dyads who received high ratings in the Maternal Cognitive Expectations category were characterized by mothers who spent more time interacting with their children than the mothers in dyads rated low on this variable. Several of the categories showed strong negative correlations with the behavioral variable Infant Toy Play; apparently, mothers who provide a secure, structured environment, whose expectations about their child's cognitive and affective development seem realistic, and who are highly verbal had infants who played less by themselves with toys in a free play setting. Similarly, dyads characterized by a high degree of integration were those in which Infant Toy Play was at a minimum. Finally, dyads judged to have a high degree of integration were those in which overall maternal responsivity (as measured by the Lewis and Lee-Painter behavioral checklist) was also at a maximum.

Discussion

These preliminary results are but a first approximation of the relationship between qualitative evaluation and behavioral description in mother-infant interaction. More definitive statements await furthe refinement of the measures and their application to a larger sample of subjects. At present, however, it seems possible that qualitative judgments about mother-infant interaction bear meaningful relation with behavioral data. Significant relationships between categories and behaviors both shed meaning on the behavioral data and provide a measure of behavioral validity for the rating scales. The findings so far confirm that the behavioral checklist is picking up important elements of mother-infant interaction and suggest that patterns of behavioral interaction may take on new meanings that before went unnoticed.

Accomplishments to Date

1. Further analysis of original ten subject pilot data: intercorrelation of clinical rating scale categories.
2. Training and inter rater reliability study with additional clinical rater.
3. Enlargements of sample to include four groups of mothers and their infants: sick, healthy, preterm, and term.
4. Revision of quantitative behavioral coding system.

The Quality of Mother-Infant Attachment Relationship as Related to Social Emotional Adjustment at School Age

Carolyn McGuffog

Rationale

Theoretical formulations of emotional development, (e.g., Erikson, 1950; Escalona, 1968; Mahler, 1975) and early intervention programs servicing children "at risk" for emotional problems, rest on the premise that there is a coherence in personality development over time. It is assumed that later emotional functioning is linked in a logical manner to the quality of early experiences - in particular, to the quality of the mother-infant relationship (Ainsworth, 1977). Longitudinal studies which have examined measures in infancy as predictors of later status have focused primarily on personality traits (e.g., temperament) or discrete behaviors (Thomas et al., 1963; Schaeffer & Bayley, 1963). The results of these studies conclude that within the normal range of personality variation no prediction of later behavior patterns can be made from ratings in early infancy (Thomas, 1966; Schaeffer & Bayley, 1963; Kagan & Moss, 1962). However, researchers working within the ethological-evolutionary theory of attachment purport that an enduring affective bond develops between an infant and his mother during the first year of the baby's life, and that the strength of this bond reveals qualitative aspects of the mother-child interaction (Bowlby, 1969; Ainsworth, 1969). There are studies demonstrating that the attachment relationship remains stable over time, if the quality of the affective bond is inferred from patterns and organization of behavior rather than from frequency of discrete behaviors (Waters, 1978; Ainsworth & Bell, 1970; Sroufe & Waters, 1977). This suggests that attachment - viewed as a developmental/organizational construct may serve as a link between early experience and later functioning (Matas, Arend, Sroufe, 1978).

Ainsworth and Wittig (1969) developed a laboratory procedure, referred to as the Strange Situation, to highlight the operation of an attachment behavioral system in order that individual differences in the quality of attachment could be defined. In the Strange Situation, infants are assigned to one of three categories (secure/normative, anxious or ambivalent) on the basis of their attachment/exploration balance, use of the caregiver as a base for exploration. and ability to derive comfort from the caregiver. This classification system has been shown to be highly reliable, yield stable individual differences, and to be related to the mother-infant interaction during the first year of life (Ainsworth, Blehar, Water & Wall, 1978; Waters, 1978; Sroufe & Waters, 1977). Given this well-developed and validated procedure for assessing the attachment relationship it becomes possible to test the assumption that early experiences (as defined by quality of attachment) are linked in a logical manner to later functioning in childhood.

Matas, Ahrend, and Sroufe (1978) hypothesized that the child with a secure, effective attachment relationship will later exhibit competent, more autonomous functioning in terms of both affective involvement and problem solving style. Their study classified infants as to the quality of their attachment relationship based on 18 month strange situation behavior and then assessed the children's play behavior and problem solving behavior at 24 months. The results support their hypothesis: securely attached infants were more cooperative, enthusiastic, persistent, and in general, more effective than insecurely attached infants in the two year assessment. Main (1977) has presented similar findings. Subsequently, Waters, Wippman and Sroufe (1979) examined continuity in individual adaptation from 15 months to 3 1/2 years. These authors found children who had been secure in their attachment as infants scored significantly higher on scales measuring both peer competence and ego strength/effectance than children who had been classified as anxiously attached as infants. Waters et al., (1979) did not have the mother present for the 3 1/2 year assessment, thus, their results suggest that while the quality of the attachment is a product of the caregiver infant interaction; the continuity demonstrated cannot be attributable to maternal behavior in the assessment situation.

Ahrend, Gove and Sroufe (1979) followed the Matas et al., (1978) sample and reassessed them at age five using ego-resiliency (developed by Block & Block, in press) and curiosity as competence measures. The results demonstrate that children earlier classified as securely attached were, as predicted, significantly more ego-resilient (able to respond flexibly, persistently, and resourcefully) and curious than anxiously attached infants. The data provide initial links between the infant's quality of attachment and competence during toddler and pre-school years.

Sroufe (1979) suggests that the linking of felt security within the infant attachment relationship to emotional involvement in the school years is perhaps the central task in the study of emotional development. If it is found that securely attached infants are later characterized by their more adaptive emotional functioning, attachment theory may take on new significance for the study of emotional disorders (Sroufe, 1979). Bower (1969) estimated that 10% of the child population needs intervention (of any type) at some time during their school careers because of troublesome behavior. However, when regular classroom teachers were given the opportunity to freely report their perception of the behavior of their students, the prevalence estimate of behavioral disorders rose to 20.4% (Kelly, Bullock, and Kykes, 1977). Ullman (1952) concluded that teachers are frequently in agreement with other mental health professionals regarding the mental health of children in their classes. If Ullman's (1952) and Kelly's et al., (1977) findings are accurate they suggest that 20.4% of the children attending regular school are emotionally maladjusted to some degree.

The present study will take the findings linking attachment in infancy to adaptive functioning during pre-school years one step further. The relationship between the quality of attachment at 12 months and emotional adjustment, school performance, and peer competence at age 6 will be examined. These measures have been chosen in order to highlight the later behavioral manifestations of the early attachment relationship. It is expected that securely attached infants will be better emotionally adjusted at school age than will anxiously attached infants. In addition, those cases not demonstrating continuity in development (e.g., anxiously attached infant is well adjusted at age 6) will be analyzed in an attempt to identify intervening variables. The three assessment measures will be intercorrelated in order to determine the relationship between school performance, emotional adjustment, and social adjustment.

Method

Subjects. The subjects are approximately 115 white, normal, middle class children and their mothers who have been part of a longitudinal study at Educational Testing Services since the children were 3 months of age. Personal background available on these children includes: IQ (at 1 year), birth order, family composition, and any major stressful life events (i.e., divorce) which may have occurred.

Procedure and Measure. At 12 months of age each mother and child dyad was videotaped in a playroom during several episodes. The first episode was a free play situation with the mother present. After fifteen minutes the mother was instructed to leave the playroom (in her usual manner of departure). The infant remained in the playroom alone for three minutes, or less if the infant was very distressed. The mother then re-entered and the free play session continued for an additional five minutes. The child's behavior was coded during the last three minutes of the initial free play period, during the entire separation and then during the first three minutes of reunion. On the basis of these observations the infant was assigned to one of three categories: A - anxious attachment, characterized primarily by avoidant behavior during reunion; B - secure/normative attachment, characterized by proximity and contact seeking behavior during reunion; and C - ambivalent attachment, characterized by generally maladaptive behavior, particularly anger or passivity. This classification procedure is a modified version of the Ainswroth and Wittig (1969) Strange Situation, in that there is only one separation and no stranger is introduced. This modified version was used by Sroufe & Waters (1977), and was approved by M.D. Salter Ainsworth and Michael Lamb (personal communication) as a valid system for assessing the quality of the attachment relationship.

Data were collected on the emotional adjustment of these same children at age six. The Child Behavior Profile (Achenbach, 1978) was administered to each mother. This is a behavior rating scale designed to obtain parent's reports of their children's competencies and problems in a standardized format. A comparison of the ratings disturbed and normal children received on the Child Behavior Profile showed differences ($\underline{p} < .001$) on all behavior problem and social competence scores (Achenbach, 1978). Eight-day test-retest correlations averaged .89, whereas interparent correlations average .74 (Achenbach, 1978). The teacher Report of the Child Behavior Inventory was sent to the first grade teachers of each of the children. The Child Behavior Inventory was devised by E. Schaeffer and Edgerton who report on average internal consistency reliability score of .88 (N = 184) and an average inter rater reliability score of .73 (N = 88) (1978).

The Preschool Interpersonal Problem Solving task, devised by Spivak, Platt, & Shure (1976), was administered to each child in a laboratory setting. The task, based on a child's responses to various hypothetical social situations (i.e., what would you do if your friend had some cookies and you wanted some?), yeilds a measure of social adjustment.

Finally, a questionnaire was sent to each child's parent requesting information on any events the family may have encountered which would have an impact upon the adjustment of the child (i.e., death of loved one, illness etc.). Vaughn, et al., (1979) reported that change from secure to anxious attachment was associated with higher stressful event scores than stable secure attachment.

Results

While the results of this present study do lend some support to the predictive power of attachment, these data were inconsistent with previous longitudinal attachment findings in three ways. Firstly, while other studies have combined the avoidant and ambivalent groups to create an anxiously attached group, the present study found that avoidant children often behaved more similarly to secure than ambivalent youngsters. Secondly, in the present study, a number of sex differences at age six years were identified, although previous longitudinal attachment studies have not reported sex differences. Lastly, the present longitudinal investigation revealed one year attachment classification significantly predictive of six year emotional competence for males, though not for females. Amount or severity of environmental stress contributed little to prediction of later behavior.

Difficulty demonstrating continuity in development was highlighted by a low overall correlation between parent and teacher ratings of child competence. Failure to derive a single competence rating lead to the conclusion that competence appeared to be defined by the situation, rater and measure employed.

Implications

The present study concluded that evaluation of mother-infant attachment quality, even when supplemented by a measure of environmental stress, was insufficient to predict later social emotional competence, particularly for females. It was suggested that the influence of additional socializing forces needs to be considered before accurate early identification of children at risk for behavior disorders is possible.

Accomplishments to Date

The data was collected and analyzed. A report of this research has been written.

Age as a Social Cognition

Lucille Weistuch

Rationale

Anthropological literature has suggested that age knowledge is relative. Age perception appears to fluctuate in accordance with position on the age continuum. Stafford (1977) determined that the teen perceives himself as an adult (defining himself as independent and as capable of adult pursuits) before the adult defines him so. Cameron (1969), exploring the normative usage of the terms young adult, middle-aged, old adult and aged adult asked 571 subjects representative of the life span to provide boundaries for the above categories. Analyses indicated that there was a tendency for boundaries to rise somewhat with age. Thus, young persons tended to perceive young adulthood as beginning at an earlier age than did middle-aged and older ones. Similarly, older persons set the age base into all categories later than did their younger counterparts. Drevenstedt (1976), also interested in the setting of age boundaries across the life-span, compared the responses of undergraduates and persons aged 60-75 years on age category perception.

Boundaries were again found to vary as a function of subject age. Older persons generally judged basal category ages as occurring later than did their younger counterparts. Because of these fluctuations in age perception, we hold to the position that age knowledge is a social cognition and, as such, can be expected to be heavily influenced by the characteristics of the perceiver in interaction with the characteristics of the perceived.

Available literature on the development of the age concept in children indicates that children too are capable of making age judgements. Kogan, Stephens and Shelton (1961) found that when four-and five-year-old children were presented with an array of photographed faces ranging in age from 9-76 years, they were able to correctly judge the oldest, next oldest, etc. Brooks-Gunn and Lewis (1978), found that even 16-18 month old babies react differently to slides of peers and adults - looking longest at slides of adults while showing the greatest amount of affect to slides of babies; it appears that young children can be expected to be able to perform on a relative age discrimination task.

Additionally, children's age knowledge, like the age knowledge of adults appears to be dependent on subject age. Britton and Britton (1969), found that when they exposed fifty preschool children to figures of children, adolescents, young adults, middle-aged adults, and older adults, .67 of children were able to identify the children as the youngest figures. In contrast, less than .20 of children were correctly able to identify the oldest figure. Furthermore, older preschoolers were found to respond more accurately to the adult baseline than were younger children. Children, like adults, appear to use their own age as a reference point for age judgement.

The effects of subject and stimulus characteristics on age knowledge were explored in both a preschool and an adult population. Several effects were explored for each group of subjects. For preschoolers, it was hypothesized that the gender of the stimulus, the gender of the subject, and the child's concept of himself as little or big would influence placement of photos into age categories. For adults, it was hypothesized that the gender of the stimulus, the gender of the subject, and the age of the subject would influence placement of photos into age categories. Additionally, it was hypothesized that when responses of preschoolers and adults were compared, preschoolers would set lower age boundaries into each category than would their adult counterparts.

Method

Subjects. Fifty preschoolers (25 males and 25 females) between the ages of 3 and 5 years served as the preschool sample. Fifty adults (25 males and 25 females) between the ages of 20 and 70 years served as the adult sample. 5 males and 5 females belonged to each of the following age groups: 20's, 30's, 40's, 50's, and 60's.

Procedure. Both groups of subjects were exposed to photos of male and female faces ranging in age from 1-70 years. Subjects were asked to place each photo in one of four categories: little child, big child, parent, and grandparent. Additionally, preschoolers were asked to categorize photos of themselves as little or big children.

Results

For preschoolers, stimulus gender and subject self perception were found to significantly affect the placement of stimuli into age categories. Subjects tended to view males as older than females of comparable age during the earlier stages of the life cycle while viewing females as older during the later years. Children who classified themselves as "big" also were found to place stimuli in older categories at earlier ages than children who classified themselves as little.

For adults, stimulus gender was again found to affect category placement, adults also viewed males as older than females of comparable age during the earlier stages of the life-cycle while viewing females as older during the later years. This effect was found to exist both when subjects were asked to categorize stimuli and when they were asked to estimate photo age.

Age was also found to affect stimulus placement. When the responses of young (20-35), middle-aged (35-49), and older (+49) adults were compared, it was found that young adults perceived transitions into older categories to occur at earlier ages than did older adults.

A comparison of preschool and adult photo categorizations indicated that preschoolers set lower age boundaries into the categories of "big children" and "parent" than did adults.

Age estimation data also indicated that older adults err significantly more than do younger ones when judging the ages of stimuli 1-40 years. This finding, when integrated with the finding of preschool vs. adult categorization difference indicates that accuracy of age perception is substantially affected by the subject's own life-cycle position.

Accomplishments to Date

1) study designed;

2) data collection completed;

3) data analysis conducted;.

4) paper presented at conference;

5) monograph being readied for publication.

The Effects of Language Workshops on Maternal Expectancy and Language Use with Normal and Down's Syndrome Children

Lucille Weistuch

Rationale

There is a body of literature indicating that mothers speak in specific predictable wavs to their language learning children and that these ways change, again predictable in accordance with children's developing linguistic competencies (Philips, 1973; Snow 1972; Longhurst and Stepanich, 1975).

While it is true that the tutorial nature of these parameters has only barely begun to be studied and that incontrovertible evidence has not yet been drawn (Nelson & Bonvillian, 1975), some investigations (Newport, Gleitman & Gleitman, 1976; Cross, 1976, 1978; Nelson & Bonvillian, 1975) have indicated that certain features of the "simplified register" are beneficial to children's linguistic growth.

If certain aspects of maternal speech are facilitative of child language acquisition, it is imperative that mentally retarded children be exposed to them. At present, there is a great deal of controversy surrounding the issue of equal exposure. Much of the controversy revolves around the method used to study the phenomenon. Studies matching Down's Syndrome and non-handicapped children on chronological age (e.g. Buium, Rynders & Turnure, 1974) and exploring syntactic aspects of maternal speech have concluded that mothers of Down's Syndrome children provide a syntactically much simpler linguistic environment for their children than mothers of non-handicapped children do. Some investigators have alluded to the fact that provision of this more primitive linguistic environment further handicaps children (Spradlin & Rosenberg, 1964).

In contrast, studies exploring the complexity of maternal syntax used by mothers whose Down's Syndrome and non-handicapped children have been matched on mean-length-of-utterance (e.g. Rondal, 1978) have concluded that the maternal speech addressed to handicapped and non-handicapped children of similar linguistic level is of equal complexity. In an extension of this finding, Rondal has argued that since mothers have, in general, been found to speak to their children's level of language complexity, the speech addressed to Down's Syndrome language learning children is perfectly appropriate.

Recently, however, the study of maternal language use has begun to shift from exploration of syntax to exploration of how mothers use language in context for the purpose of teaching communicative skills. Many reasons have been cited for this shift. Primary among them have been documentation of the mother's role in teaching the child to turn-take (Bruner, 1975; Messer, 1976), documentation of the mother's role in teaching the child how words map onto the objects, events, and actions in the child's immediate perceptual surround (Bloom & Lahey, 1978) and documentation of how the child's first words contain illocutionary force (Dore, 1975; Greenfield, Smith & Laufer, 1977).

Research with handicapped populations has indicated that parents of handicapped children might not match their conversational adjustments to their children's linguistic levels. Newhoff, Silverman and Millett (1980) explored the use of semantically related responses and deictic utterances in the speech of both mothers and fathers of normal and language disordered children. Similarly, Macpherson and Olson (1980), exploring the discourse adjustments used by mothers of normal and language disordered children found that, in spite of the children being matched for linguistic competency, mothers of non-handicapped children used higher proportions of expansions and semantic extensions.

The purpose of this study was to examine the language styles of mothers of handicapped and non-handicapped children matched for MLU 1.0-1.5 Examination focused on:

a) whether the two groups of mothers differed in their language styles;

b) whether stylistic differences were related to child competency and/or maternal expectancy differences;

c) whether language workshops affected mother/child verbal interactions and, if so, whether they affected the interactions differently for mothers of handicapped and non-handicapped children;

d) whether language workshops affected child language growth; and

e) whether language workshops affected maternal expectancy.

Subjects and Procedure

The data were collected on mothers of handicapped and non-handicapped children and their children matched for MLU 1.0-1.5. Dyads were videotaped twice--three months apart--and language was coded in accordance with an early dialogue code developed by the investigator. At each taping session, mothers also filled out two expectancy questionnaires from which the expectancy data were generated.

In between taping sessions, half of each group of mothers was exposed to a series of language training workshops in which mothers were taught to use techniques designed to get their children to more actively participate in the language process.

Results, Summary and Implications

Results of this study indicated that mothers of handicapped and non-handicapped children exhibited different language teaching styles; mothers of children with Down's Syndrome were found to be more directive and were found to not give their children as much semantic and topic-maintaining information. This stylistic difference appeared to be related to differences in child responsiveness -- not maternal expectancy.

Post-test data indicated that there was a weak intervention effect across both groups of mothers. Mothers of children who received intervention used a higher rate of expansions, extensions, and contextual references than mothers who did not.

These changes in maternal speech were found to have some effects on child language behavior. Both non-handicapped and handicapped intervention children increased their answering abilities relative to control subjects and non-handicapped children additionally increased their MLU.

Intervention was also found to affect the relationship between expectancy and language use changes. For mothers who received intervention, language and expectancy changes more often correlated.

It was concluded that mothers of handicapped children might benefit from a language program of this type but that additional data needs to be collected on a larger sample and for a longer time before definitive statements can be made.

Accomplishments to Date

The study has been designed, the data have been collected, analyzed and written up in dissertation form.

The Development of Mental Abilities: A Multidimensional Model of Intelligence in Infancy

Mary Enright

Rationale

Intelligence has been conceptualized by some as a unitary attribute g (Burt, Jones, Miller & Moodie, 1934; Spearman, 1927). An alternative view is that intelligence represents a set of loosely related but diverse skills (Cattell, 1952, 1953; Guilford, 1956; Thurstone, 1938). Although the general g model of intelligence is still commonly held (e.g., Wilson, Brown & Mathew, 1971), questions about the validity of this concept have been raised. In particular, during the last decade, research concerning the nature and development of infant intelligence has produced evidence incompatable with the idea of general intelligence. First, the notion of a unitary and pervasive general mental ability implies that performance on a variety of intellectual tasks will be related. However, research on the relationship between performance on various tasks of mental skills has provided little evidence that infant IQ performance, when considered as a total score, is highly related to other concurrent intellectual activities (King & Seegmiller, 1973; Lewis & McGurk, 1972; Uzgiris, 1976).

Secondly, given the expectation that g is stable over the life span of an individual and that it grows quantitatively rather than qualitatively, one might expect high correlation in intelligence over age. However, research has shown that infant intelligence test scores during the first 2 years of life correlate weakly or not at all with scores earned at age 4 years or later (Bayley, 1970; Scott & Ball, 1965).

Recognition of these problems with the concept of a general mental ability led McCall and his associates (McCall, Hogarty & Hurlburt, 1972; McCall, Eichorn & Hogarty, 1977) to propose an alternative approach to the study of infant mental development based on a concept of intelligence as a set of separable but loosely related skills (cf. Cattell, 1952, 1953; Guilford, 1956; Thurstone, 1938). McCall and his colleagues performed principal component analyses on items both from the Gesell Developmental Schedules (McCall et al., 1972) and from the California First Year and Preschool Scales, precursors of the contemporary Bayley Scales of Infant Development (McCall et al., 1977).

Theoretically, this research by McCall and his colleagues represents a "new look" at infant intelligence. However, there is a contradiction between the theoretical position adopted and the statistical procedure used to implement it. Although McCall and his associates (McCall et al., 1972; McCall et al., 1977) have explicitly rejected the notion of g, they have used the statistical procedure, principal component anslysis, traditionally associated with and used to support the concept of general intelligence (Burt et al., 1934; Spearman, 1927; Thurstone, 1938; and more recently Gould, 1981). By using principal component analysis, McCall and his associates identified a single, general ability most characteristic of mental activity at a particular developmental stage.

Theorists who view intelligence as multidimensional (e.g., Thurstone, 1938) have traditionally used factor rotation methods to isolate clusters of related items and to identify discrete and separable mental skills. Thus if one rejects the concept of general intelligence, an alternative model of mental development might involve identifying a set of skills that co-exist at a particular point in development and investigating the relationship between these skills over age. Such a model is best developed through the use of factor rotations which allow for the identification of the various dimensions (rather than the predominant character) of infant intelligence at each age level.

The purpose of the present study was to explore a multidimensional model of infant intelligence through factor analysis of the Bayley Mental Scale items administered to a longitudinal sample and to examine the relationship between these factors or skills over the first 3 years of life. An oblique factor rotation which generates nonorthogonal factors was used. Such a rotation produces separate though not necessarily independent factors that are likely to be specific and readily interpretable. An oblique rotation is both consistent with a multifactor model of intelligence and realistic in that the factors or skills are not assumed to be unrelated to each other. As a further development of the multidimensional model of intelligence, the Bayley factors generated in infancy were related to each other and to performance on the Stanford-Binet at 3 years of age. In addition, sex differences in the pattern of intellectual development were explored.

Method

Sample. A longitudinal sample of healthy, normal infants were tested at ages 3 months (N = 189), 12 months (N = 166), 24 months (N = 139), and 36 months (N = 121). At each age, there were approximately equal numbers of males and females.

Assessment. The Bayley Mental Scale of Infant Development was used at ages 3, 12, and 24 months; the Stanford-Binet was used at age 36 months.

Factor Analyses. Hierarchical factor analyses were undertaken for responses to Bayley items at ages 3, 12, and 24 months. Factor analytic techniques, rather than principal component analyses, were selected in order to identify various qualitatively distinct although overlapping skills comprising intellectual performance at different points in infancy.

Correlational Analyses. To explore the relationships between factors at any given age and among factors across age, correlations were calculated between the factor scores derived from the Bayley items at ages 3, 12, and 24 months. In addition these factor scores were correlated with Stanford-Binet performance at 36 months. Correlations were calculated for the sample as a whole and for males and females separately.

Results

The skills identified changed over development. At 3 months of age, four factors emerged: Manipulation, Auditory Production, Search, and Social Attention.

At 12 months, three factors were apparent: Imitation, Means-End and Verbal-Skill. By 24 months, there were two linguistic factors, a Verbal-Symbolic one a Lexical one, as well as an Imitation factor and a Spatial factor. The relationship among these factors during the first two years and to performance on the Stanford-Binet at 36 months were also examined. For the group as a whole, separate verbal, social, and nonverbal paths of development were evident. Furthermore, the pattern of development appeared to be more organized and coherent in males than in females. This model of mental development, which emphasizes transformations in a varied set of skills over time, suggests that, within the constraints imposed by species-specific maturation of basic skills, mental development may follow a number of flexible and diversified paths.

Implications

The identification of a diverse set of skills which characterize mental activity at different ages is an important step in constructing a competency profile applicable to both normal and handicapped infants. Rather than characterizing an infant in terms of an overall, summary IQ or Developmental score, an infant's strengths and weaknesses in different skill domains can be examined and a profile based on factor-scales can be constructed. Such a profile would be helpful to parents and teachers in that it identifies both specific behavioral deficits and strengths and thus would be useful in formulating curriculum and appropriate interventions for individual infants.

Accomplishments to Date

Analysis of data from a normal sample has been completed and a report has been written and submitted for publication. Analysis of data from a handicapped sample is presently underway.

Related Projects

Additional research projects have been undertaken that are directly related to the Institute mission described in this report. Funding has been sought for many of these projects from a variety of sources. These research projects, which are briefly described in the following pages, include investigations of:

1) Measurement of Social-Emotional Development

2) Self-Concept

3) Sex Role Identity

4) Examination of Transivity

5) Social and Cognitive Development of Only and First Born Children

6) The Effect of Birth Order on Mother-Child Relationships

7) Perceptual-Cognitive Development

8) The Child and the Family System

9) Evaluation of Integrated Educational Services for Severely Handicapped Children and Youth

Measurement of Social-Emotional Development Project

One of the Infant Laboratory's major efforts has been to integrate what is known about social-emotional growth and to devise an instrument for assessing its level of development. Emotional development is difficult to assess; yet, we can infer infants' feelings by examining the situations in which behavior occurs.

To accomplish this, we have devised a situation-based instrument to record data describing behavior in five social-emotional domains: happiness, fear, anger and frustration, attachment, and social-emotional competence. This instrument can be used in nursery schools, day-care centers, homes, and other natural settings to complement the variety of cognitive instruments psychologists now use to evaluate infants' growth. In our laboratory, we are using the instrument to gather data on infant's social-emotional skills at various points during their first three years of life.

To accomplish this, we have devised a situation-based instrument to record data describing behavior in five social-emotional domains: happiness, fear, anger and frustration, attachment, and social-emotional competence. This instrument can be used in nursery schools, day-care centers, homes, and other natural settings to complement the variety of cognitive instruments psychologists now use to evaluate infants' growth. In our laboratory, we are using the instrument to gather data on infant's social-emotional skills at various points during their first three years of life.

Self-Concept Project

One aspect of development is so important that it demainds extensive study—the process through which an infant learns his own sense of identity. During his first year, an infant learns to differentiate between people and objects and then between himself and his mother. He also forms categories by which he can describe himself and realizes that some categories, like gender, remain constant while others, like age, change.

One way to investigate the formation of self-awareness is to study infants' reactions to srrangers. In one experiment, at different times three strangers—an adult male, an adult female, and a four-year-old girl—each slowly approached infants from 7 weeks to 18 months old. The infants showed fear of the adults but smiled and reached for or approached the strange child—actions that cannot be interpreted by any existing theory but that clearly indicate infants put unknown people into categories and react consistently to each group. It may be that the unfamiliar adults were large and therefore threatening but the unknown child was not much larger and thereby intriguing.

Since there is no research on the creation of self-concept in the early years, we have devised three methods for exploring the process.

In the first, infants see pictures of themselves, their mothers, and strangers (infants, children, and adults). By the age of 15 months, they are able to recognize photos of their mothers and to differentiate between photos of themselves and other infants. They can also distinguish classes of strangers and detect the sex of an infant from facial photographs—a feat few adults can equal.

In the second method, infants see themselves in mirrors. When we place rouge on an infant's nose under the guise of wiping his face, those over 18 months of age consistently reach for their own noses, whereas infants under 15 months reach for the mirror image.

In the third method, infants first see videotapes of themselves, then other infants, and themselves once again after a three-second delay. Infants as young as 12 months are more attracted to images of themselves than of other infants, and not until they reach 18 months do they realize that their actions and the delayed images are not in unison.

We are also exploring the relation between preschoolers' self-recognition and self-concept. If we can uncover the roots of positive self-concepts, psychologists, educators, and parents may be able to find ways to help strengthen children's views of themselves.

Sex Role Identity Project

In studying the sex differences of infants, at least three questions can be posed:

1) How do biological and social factors affect infants' sexual identities?

2) How do parents teach infants appropriate sex roles?

3) How do infants learn appropriate sex roles?

Both biological and social factors influence an infant's acquisition of sexual identity. Parents reinforce those innate sexual behaviors that society deems appropriate and ignore or discourage those it deems inappropriate.

Parents treat their boys and girls differently and children respond differently as early as the age of 12 weeks. Girls of that age pay more attention to sound than do boys, although both attend equally to visual stimuli. Perhaps this can be explained by the observation that mothers talk more to 12-week-old girls than boys.

Parents also emphasize sexual differences. One striking example is an experiment with different-sex twins, in which every mother chose to bring her daughter to the Infant Laboratory clothed in a dress or pink, red, or yellow overalls and her son in brown, blue, or green overalls.

Infants also learn to respond appropriately according to their sex. This means, of course that infants must recognize that they are like some infants and different from others. We have found that infants perfer to look at pictures of and play with other infants of their own sex. They must, therefore, pick up cues from their families as to their gender and the behaviors expected of them.

The Examination of Transitivity Project

Transitivity is an influential process that effects the child's relationship with its family and others. The principle of transitivity takes the following form: A has a relationship to B, B has a relationship to C, therefore A has a relationship to C. The relation between elements (A, B, C) may be positive or negative and may vary in intensity; however, A's relationship to C is based part on $A \rightleftarrows B$ and $B \rightleftarrows C$. For example, the child's relationship to the mother and the mother's relationship to the father should influence the child's relationship to the father in addition to or regardless of the amount of direct interaction between father and child. Transitivity relationships are determined by the intensity and sign of the direct relationships. In other words, a very positive child-mother relationship and a very positive mother-father relationship, even in the absence of a direct father-child relationship, should result in a positive father-child relationship.

Observations at a day care center lend support for the operation of transitivity effects in interactions. At the appearance of a stranger some young children show stranger fear—they refuse to move toward the stranger to play or to take an object from his or her hand. We have found that in a group setting, if another child approaches the stranger, plays, and takes the toy, the first child's fear seems to dissipate. In this case the stranger's relationship with the child's peer facilitates, through the child-peer relationship, the child-stranger interaction. Transitivity may help in establishing and maintaining all extended social networks. Not only may it explain the child's relationship to his or her immediate family but to the kinship group in general. Transitivity, may be the mechanism whereby children establish relationships with aunts, uncles, grandparents, as well as friends of the parents and other unfamiliar people. Currently in our laboratory we are studying the ways transitivity operates to influence a child's relationship with its parents as well as a child's relationship to strangers.

Social and Cognitive Development of Only and First Born Children Project

The purpose of this research is to explore and compare the social-emotional and perceptual-cognitive development of first born infants who remain only children and first born infants who acquire a sibling during the first three years of life. Both cross-sectional and longitudinal analyses will be performed on three age levels (3, 12, and 24 months) in order to determine differences between onlies and first borns at a particular age level and over time. This work emphasizes the importance of studying the inception of early social-emotional patterns which exist in mother-infant interaction patterns and early perceptual-cognitive skills as measured by a variety of assessment instruments and by the verbal behavior of the dyads. Questions of interest include: the immediate and delayed impact of acquiring a sibling on the mother-child relationship and on the child's cognitive performance; the consequences of having an only child for both mother and child; the antecedents to the decision to have a second child and the nature of mother-infant interaction as a function of the mothers' locus of control, femininity, concepts of ideal family size and family planning, and her early interactions with the first child.

Answers to such questions should prove valuable to those seeking, as well as those providing, family planning counseling. The results will also provide useful information concerning the types of interactions and environments that are conductive to rapid intellectual and emotional growth.

The Effect of Birth Order on Mother-Child Relationship Project

The purpose of this research is the examination of the effects of birth order (first, second, third,...born), sex of infant, and socioeconomic level of parents on the quality and nature of the mother-infant relationship. The work emphasizes the importance of studying the development of cognitive development and socioemotional patterns from early interaction with the infant's primary caretaker, its mother. By studying early mother-child interaction patterns as a function of the proposed variables, a more meaningful account can be given as to why these variables affect later intellectual and emotional development. Cross-sectional and longitudinal designs have been employed in studying the changes of the mother-infant interaction patterns as a function of the above variables. The focus, with each sample, is on the youngest child in interaction with its mother at three age periods: three months, one year, and two years of age. Interaction analyses of such early infant behaviors as frequency of crying-fretting, frequency of vocalization, smiling, movement, and "play" and such mother-initiated behaviors as holding, vocalizing to, feeding, play, etc., are studied to determine the degree to which the infant's behaviors are conditionally altered by the mother's behavior. Similarly, in addition to studying the infant's responsiveness to particular maternal stimulation, the reciprocal effect of the mother's responsiveness to particular infant-initiated behaviors are examined.

Perceptual-Cognitive Development Project

In the case of the investigation of perceptual-cognitive functioning and development, a major goal has been to characterize the structure of cognition at each age level and to describe and understand the nature of changes in the structure of cognition as the infant develops. The two main methodological strategies employed in our attempt to characterize the structure of cognition have been: (1) to administer a wide variety of perceptual-cognitive tasks at each age level and examine the intercorrelations in performance, and (2) to factor analyze the Bayley Mental Scale (given at ages at ages 3, 12, and 24 months) in order to identify the skills or domains of infant intelligence which may be masked by the total test score. Our analyses of perceptual-cognitive performance indicate that infant intelligence is not a general g factor but a multidimensional construct comprised of loosely related skills which change in nature during the course of development.

The analysis of the relationship between mother-infant interaction and perceptual-cognitive development has thus far indicated that the amount of maternal behavior emitted is unrelated to cognitive performance, but the amount of maternal responsivity and maternal behavior taking place in the context of dyadic interaction is positively related to cognitive performance. That is, mothers who behave in synchrony or in a turn-taking, contingent fashion with their infants are more likely to have infants who perform well on perceptual-cognitive measures than are mothers who simply emit a great deal of noncontingent behavior. This finding is directly relevant to the Institute studies on at risk and handicapped infants in which methodologies based on the contingency concept have been developed and employed. In fact, since the Institute projects on at risk and handicapped populations share goals similar to those as the projects on normal populations, many of the methodologies used in the study of mother-infant interaction and perceptual-cognitive performance in this nonhandicapped sample served as a foundation for the approach developed for the study of at risk and handicapped populations. This integrative effort will make it possible to compare findings across projects using diverse populations.

The Child and the Family System Project

The basic orientation of this research is that the family represents an important environment within which the young child develops. To understand what and how familial factors influence the child, examination of the family as a system of mutual influences and relationship must be undertaken. Viewing the family as a system is not new, since various sociologists and therapists have applied such models for the last two decades (cf., Bowen, 1972; Hill, 1973; Parsons & Bales, 1955). While these efforts have attempted to describe demographic characteristics of families, they have not focused directly on the identification of family interaction patterns and how these patterns are related to a young child's cognitive skills or personality. Within the domain of child psychology, the emphasis in research has been on the parent-child dyad rather than on the child as a member of its family system. The psychological research that has examined relationships between family variables and the young child's development has tended not only to use global indicators of family characteristics (e.g., family size) but has also tended to overlook the family acting as a system. On the conceptual level, however, several investigators have begun to suggest the importance of examining the child as a member of its family system in order to construct a more complete model of socialization in young children (cf., Bronfenbrenner, 1973; Feiring & Lewis, 1978). In order to understand how the child is influenced by its membership in a family, we suggest one must begin with a description of the family interaction patterns. To characterize a child as a member of a family system and as an individual who is influenced by this system, the family must be examined as it functions as a whole.

The purpose of this research is to describe family interaction patterns and relate these interaction patterns to the characteristics of 3-year-old children. Family size has been shown to be related to a child's cognitive abilities and personality (cf., Terhune, 1974; Zajonc & Markus, 1975). Consequently, we are interested in whether interaction patterns in the family system vary with size, although an equal concern is to identify family interaction characteristics (regardless of size) and relate them to child characteristics.

In the present investigation, patterns of family interaction are being examined in families ranging in size from one to four children. Naturalistic observations of the families have been collected during a dinner time situation when all nuclear family members were present. Characteristics of the family as a group, the contribution of each individual member to the overall patterns of family interaction, as well as the nature of interaction in specific dyads, are being analyzed. In each case, measures are being taken of the frequency as well as the content of interaction (i.e., contents that relate to social functions such as caregiving, information exchange, and play). In our examination of family interaction patterns, our focus is on 3-year-old children as members of a family system. Of particular interest is the relationship between patterns of family interaction and individual attributes of 3-year-old target children. Cognitive competence and sense of personal control of 3-year-old children have been assessed in a laboratory setting and these child characteristics are being examined for their relationship to patterns of family interaction.

Thus, the research effort is directed toward examining the child as a member of the family system as well as the influence of the family on the child's personality and cognitive abilities. This research should provide information regarding the types of experiences the child has as a member of a family, how these experiences differ with family size, and finally, how these experiences influence the child's development. The implications of such findings are both theoretical and practical. Theoretical contributions can be seen in furthering our understanding of the child as a member of a family system which influences the child and which in turn the child influences. Description of family interaction by family member, specific dyads, and social function will provide more complete information about the family structure and processes that affect the child. Practically, the findings should have useful implications for home-based early intervention/ education programs. Information about the kinds of family interaction processes (i.e., in the whole family or in parent-child, child-sibling dyads) that facilitate a child's cognitive capacity and sense of personal control could be used to develop intervention strategies. Notably, counselors cannot alter family size but they may be able to encourage certain kinds of family interactions that have positive consequences for the child's development.

Evaluation of Integrated Educational Services for Severely Handicapped Children and Youth

In the Summer of 1980, Educational Testing Service was awarded a three year contract by SEP (# 300-80-0638) to conduct a national evaluation of public school programs integrating severely handicapped students in school and/or community settings. The project is being conducted in three phases. The first phase, site selecting, began in October, 1980. The second phase, data collection, began in April, 1981 and continued through May, 1982. The third phase, data analysis and disemination, begins in June, 1982 and continues in June 1983.

The evaluation is designed as a descriptive study to identify factors in the environment which affect the integration of severely handicapped students and also, to identify the effects of varying degrees of integration on students' educational progress and attitudes.

The evaluation focuses on two aspects of integration: 1) the degree of integration which we define as the amount of time and number of different contexts in which severely handicapped students are in contact with non-handicapped students; and 2) the quality of integration, defined as the rate and type of social interactions of severely handicapped students with others in their educational environment.

The factors in the educational context which we are examining predict the degree and quality of integration include aspects of state planning, local planning, teacher preparation, parent involvement and educational process variables such as classroom behavior and organization, curriculum model, integration objectives and functional level of severely handicapped students.

The factors which are being examined as potential effects of integration of severely handicapped students include nonhandicapped students' achievement and attitudes as well as the functional progress of severely handicapped students.

The primary purpose is to identify the most critical factors across all sites which affect integration of severely handicapped students. Sites will then be examined to see how they differ on these critical factors.

C. INTERVENTION AND EVALUATION UNIT

Overview

The Intervention and Evaluation Unit is involved in developing intervention strategies and evaluating all of the Institute's projects. The Intervention-Evaluation Unit is comprised of three projects--the Contingency Intervention Project, Communicative Development Project, and the Evaluation Project.

The purpose of the Contingency Intervention Project is to facilitate handicapped infants' development through a learning to learn strategy. This strategy involves the use of action-outcome pairings, or contingencies, that occur naturally in the normal infant's world but may not in the handicapped infant's world. The objectives of the Contingency Intervention Project are to:

(1) structure the environment, including parents, teachers and manipulanda, to teach the young child effective means of controlling the environment;

(2) discover which contingencies are most lacking in the young handicapped child's environment;

(3) provide contingency experiences via parents, teachers and manipulanda;

(4) develop individualized curriculum for these children using parents, teachers and manipulanda;

(5) provide a logical, step by step curriculum, that, although individualized, moves from more simple to more complex learning;

(6) evaluate the success of the curriculum for individual children and for programs.

The purpose of the Communicative Development Project will be to devise observational systems for describing the existing communication strategies which a child is employing and to determine ways in which language intervention strategies might build upon and transform these communication strategies. Too much emphasis has been directed toward describing the target behaviors in a language intervention program while not enough emphasis has been placed on describing the behaviors which children are already using to communicate (Beveridge & Brinker, 1980; Brinker & Bricker, 1980). The Communicative Development Project will:

(1) apply an observational system developed by Brinker to the communication system used by parents and their handicapped children;

(2) develop individualized intervention strategies based upon the established functional communication system operating between parents and child;

(3) evaluate the effect of the intervention strategies on the elaboration and development of the child's communication system.

The evaluation project, in evaluating the Institute Projects, looks at the outcomes of the projects in terms of their objectives and activities.

Development of Intervention Strategies

Curriculum for parents and teachers as well as manipulanda to be used by parents and teachers will be developed in the Intervention Project. The Contingency Intervention Project manipulates the relationship between the infants' behavior and environmental events so as to highlight to the infant his/her own causal control over the environment. The process of learning under such contingencies is critical in facilitating the development of strategies for learning and for utilizing naturally occurring contingencies in the environment.

Model of Early Intervention

The Intervention Project is based on the interactional model of development which allows us to explore the consequences of early experience on later dysfunction (Bijou, 1963; Hunt, 1961).

The interactional model proposes that an early deficit will lead to poor or dysfunctional interactions between the infant and the physical/social world. Subsequent dysfunction is caused by the poor interaction, not the original trauma. Since the dysfunction seen at later ages is caused by early dysfunctional interactions, early intervention is critical. Two potentially harmful outcomes of a lag in time between identification of a dysfunction and intervention are derived from our model. The first deleterious outcome of delayed intervention is the infant's developing feelings of incompetence related to his lack of effectiveness in his commerce with the physical and social environment (White, 1959). The second deleterious result is the generalizing effect of incompetence or lack of effectiveness identified in one domain of functioning which may lead to ineffective or dysfunctional interactions in other domains (Lewis, 1976; Lewis & Cherry, 1977; Waite, 1977). The interactional model of the effects of a specific deficit thus proposes the need for early intervention and an intervention strategy which both directly addresses the specific deficit(s) identified in the Detection and Research Units and facilitates the experience of effectiveness.

In contrast, the medical model presents a more static view of trauma and resulting dysfunctioning. Simply stated, in the medical model the cause of any developmental dysfunctioning can be found in some earlier specific trauma; no interaction with the physical/social world is considered.

1. Contingency Intervention Project

Overview

The Contingency Intervention Project is based on the following premises. First, the infant's ability to relate behavior to environmental consequences is the fundamental basis for an infant's knowledge of the world. Second, awareness of such behavior-consequence relationships or contingency awareness provides the motivational basis for an active engagement of the world which the infant believes is controllable. Third, demonstration of the handicapped infant's learning within simple contingencies of reinforcement can communicate to parents a positive view of the infant as active and competent rather than as passive and inherently incompetent. This active view by the parents can lead them to provide more social contingencies for the infant. The purpose of the Contingency Intervention Project is (a) to foster a generalized expectation that the world is controllable by the infant and (b) to lead the infant to use specific movements to explore the environment.

The contingency intervention system was designed around an Apple 2 microcomputer to provide a variety of consequences for a variety of simple movements and patterns of movement. After reviewing the rationale for contingency intervention for handicapped infants, the results of the Contingency Intervention Project will be presented. The technology of the contingency intervention system is described in Chapter VII: Products, Section C. Intervention Technology in This Report.

Rationale for Contingency Intervention and Review of the Literature

The ability of infants to detect and utilize co-occurrence has particular importance for a process-oriented cognitive curriculum for handicapped infants. In order to accomplish this purpose we will focus on the possible kinds of co-occurrences, the structure of co-occurrences, and the mechanisms by which normal infants detect co-occurrences. Having done so, attention will be turned toward the difficulties of the handicapped infant in experiencing these co-occurrences and the potential impairments which are likely to result. Finally, contingency intervention from a process orientation and progress in providing such intervention will be discussed.

What is meant by the detection and utilization of co-occurrences? Consider the following examples:

> Sarah, a 3-month-old, has been asleep for the last hour for her noon nap. She awakes and begins to cry. Sarah's mother, expecting her to awake at about this time, comes through the kitchen door toward Sarah's room. Sarah hears the door swing on its hinges and stops crying. Sarah has learned to anticipate her mother's entry when she cries after a nap.
>
> Betty, a 3-month-old (age corrected for her premature birth) has had her cry responded to as consistently as Sarah's. She has not learned to associate the attendant sounds of her mother approaching and continues to cry until her mother has picked her up.

* * * * *

> Josh, a 2-month-old, is lying on his stomach moving his hands along the sheets of the crib. His hand makes contact with a rattle which he grasps. In continuing to move his hand across the sheets, the rattle which he is now holding makes a noise. Josh smiles when he hears the noise.

> Jerome is a 4-month-old infant who was deprived of oxygen during birth and suffered brain damage. He does not move his arms or legs very frequently and hence he rarely makes contact with the many available objects in his crib. Given his current motor capabilities Jerome has a reduced probability of experiencing co-occurrences between his behavior and consequent environmental events.

In each of these examples the success or failure of detecting and remembering the co-occurrences has important implications for the subsequent course of development. These include effects upon motivational, affective and cognitive structures. Such effects have been recognized only in the context of a more general recognition, over the last 20 years, that normal infants are competent beings.

It is now generally agreed that James' (1880) view of the confusing world of the infant is inaccurate. Rather, the infant should be regarded as busy, purposeful and competent (Lewis, 1977, Stone, Smith, & Murphy, 1973). Responses which were thought to be random and unorganized under the old view were now examined more carefully in order to find regularities. One of the important sources of regularity was the consistency of the child's action with its environment. Infant-centered methodologies were based upon those things which the infant could do best. Questions about perception and learning were asked so that the infant could answer by sucking (Lipsitt & Kaye, 1964), looking (Fantz, 1963), head turning (Watson & Ramey, 1972), kicking (Rovee & Rovee, 1969) or exhibiting a reflexive behavior (Papousek & Bernstein, 1969). All these behaviors were part of the infant's daily repertoire of movement.

The Concept of Co-occurrence

The interaction of the infant with its environment should be considered as the fundamental adaptive act of the newborn and very young organism. In order to locate mechanisms that facilitate such interactions we must consider the nature of co-occurrence. The three basic types of co-occurrences consist of (1) two events in the environment which occur together; (2) two events which occur together within the organism; or (3) an event in the organism which co-occurs with an event in the environment. An example of an environmental co-occurrence would be the appearance of the mother and a vocal sound from the mother. An internal co-occurrence would be, for example, closing one's eyes and experiencing darkness. Whatever the nature of co-occurrences, there exists as basic adaptive structures the ability of the organism both to detect, to associate and to remember such co-occurrences. In all of our subsequent discussion, we will be referring to co-occurrences involving the organism and the environment rather than to completely internal co-occurrences or to completely external co-occurrences.

The detection of such co-occurrences is dependent upon the young organism's sensory abilities. The association of two events which have been detected rests on some form of short-term memory. A third cognitive process necessary for the utilization of the co-occurrences is the ability of the organism to maintain that information of co-occurrence over relatively long periods of time. This process might be referred to as the infant's long-term memory ability.

In normal infants the sensory abilities, the short-term memory abilities, and the long-term memory abilities have all been demonstrated. Reviews of normal infants' visual and auditory abilities reveals a large body of research which indicates the functionality and the limits of both of these sensory systems at birth (Cohen & Salapatek, 1975). The infants' short-term memory abilities have been investigated by a number of researchers. In general, it has been found that infants under 4 months of age can learn to associate their movements with a consequent event (Sameroff & Cavanagh, 1979; Watson & Ramey, 1972; Rovee & Rovee, 1969; Millar, 1974). However, if there is a delay of more than 2 seconds between the infant's movement and the consequent event, infants as old as 9 months do not learn (Ramey & Ourth, 1971; Millar, 1972). Finally, data on patterns of habituation to a redundant stimulus reveal the operation of short-term memory which improves with age, and which is related to developmental progress as well as to other variables affecting individual infants (Lewis, Goldberg, & Campbell, 1969). Several studies have been conducted by Carolyn Rovee-Collier and her colleagues which have revealed that 3-month-old infants remember a specific response-consequent association for at least a week (Rovee-Collier & Fagen, 1981). However, a reexposure to the learning situation without actual reexposure to the response-consequence co-occurrence "reactivates" the infant's long-term memory for up to three weeks after the initial learning.

Co-occurrences act upon the organism in four distinct ways. First, co-occurrences orient the organism to attend to the environment. Secondly, they arouse the organism and help to modulate the organism's state. Third, the detection of co-occurrences leads to a positive affective tone. Fourth, co-occurrences through the operation of memory become the aliments for subsequent intentional actions and ultimately for the development of mental structure (Piaget, 1952). Each of these four aspects of co-occurrences will be discussed in the ensuing paragraphs.

The evidence for the position that co-occurrences are facilitative of infants' motivational, attentional and cognitive development derives from a variety of sources, especially the study of mothers' responsivity to their infants. Some of the studies by Lewis will be used to demonstrate this point. Lewis and Goldberg (1969) showed that a responsive environment was related to infants' perceptual-cognitive development. In a study of 3-month-olds, maternal stimulation (i.e., frequency of talking to, smiling at, or holding the infant) was compared to the responsivity of the mother (i.e., how much she engaged in these behaviors immediately after her infant vocalized, smiled, etc.). These two classes of maternal behavior were found to be related to the infant's ability to habituate to a redundant event and to attend to a novel one. However, maternal responsivity was found to be more related to these measures of an infant's information processing ability than was maternal stimulation. In another set of studies, maternal responsivity rather than maternal stimulation (either proximal or distal stimulation) were found to be significantly related to 3-month-old infants' concurrent scores on the Bayley Scales of Infant Development (Lewis & Coates, 1980). Jaskir and Lewis (1981) extended this analysis to include infants across the entire first 2 years of life. In general, maternal responsivity is significantly related to the infant's concurrent IQ scores as measured by the Bayley Mental Development Index (MDI), while maternal stimulation is either unrelated or significantly less related.

Coates and Lewis (1980) investigated whether responsivity per se was related to cognitive development or whether particular types of responsivity had differential effectiveness. Maternal responsivity was examined in the homes of 3-month-old infants. Two classes of responsivity were identified, maternal proximal and distal responsivity; proximal refers to the physical responses of touch, rock, and hold the infant while distal responsivity refers to vocalization, looking and smiling at the infant. Proximal responsivity by the mother was found to be significantly and positively correlated with concurrent 3-month-old MDI scores, however, proximal responsivity becomes progressively less related to infant MDI as the infants got older. In fact, it was significantly and negatively related to the child's IQ at 3 and 6 years. On the other hand, maternal distal responsivity at 3 months was negatively related to the infant's 3 month MDI scores but became progressively more positively related as the infant got older; distal responsivity was significantly positively related to the child's MDI at 3 and 6 years.

These studies illustrate several points which support our view. Environmental responsivity, especially that of the mother, is related to the infants' attentional and cognitive abilities. Moreover, the fact that certain classes of maternal responsivity are more effective than others provides the opportunity to explore the significant features of the environment which are most effective for the facilitation of certain skills. Such an analysis suggests a matrix consisting of the class of environmental responsivity by the class of child skills.

Since this evidence is correlational it is impossible to determine whether maternal responsivity caused developmental progress or whether cognitively advanced infants elicit more maternal responsivity. Nevertheless, the Coates and Lewis (1980) data demonstrate that if maternal responsivity exerts its effects on infant development this influence occurs very early in the infant's life and involves proximal forms of behavior. Further support would be necessary in order to clearly make a causal inference. In the following study, support for just such a causal interpretation was sought.

In order to (1) account for the causal nature of the responsivity-attention relationship and (2) to see whether responsivity other than of a social nature was effective, infants aged 8-, 16-, and 24-weeks were studied in the laboratory (Hartka & Lewis, 1981). Half of the infants in each age group were the experimental group and half were the control. Both groups were seated in an enclosure before a screen. A string was attached to their arms such that a slight arm pull resulted, for the experimental group, in the presentation of a picture. Thus, the experimental group's action (arm pull) resulted in a contingent outcome (visual stimulus). Each control subject received the same amount of stimulation as an experimental subject to whom they were yoked. Each yoked control subject received a playback of a program of stimulation from a record of an experimental subject's performance.

Subjects who received contingent stimulation rather than non-contingent stimulation were expected to differ in at least three ways; (1) they would learn to pull the string in order to turn on the picture; (2) they would be more alert and interested and therefore would stay longer in the experimental setting before crying and becoming fussy; (3) they would be happier as a consequence of the contingency between their behavior and picture onset. All three hypotheses were confirmed. The contingent group learned to pull to turn on the slides. The contingency group stayed awake, alert, and non-fussy for 17 minutes, while the non-contingency group stayed awake and non-fussy for only 11 minutes. Finally, the contingent group smiled significantly more than the control group. These significant differences emerged in spite of the fact that there were no differences in the frequency of stimulation for the groups.

The results of this study support Lewis and Goldberg's (1969) notion that contingent stimulation has cognitive, attentional and motivational effects and supports the other findings relating contingent stimulation to IQ scores. While alert and cognitively advanced infants may elicit more environmental stimulation and responsivity (Lewis & Rosenblum, 1974), these data taken together also support the view that a contingent environment facilitates the infants' cognitive development through its motivational, attentional and affective features. The laboratory study of contingency also demonstrates that environmental contingencies need not be social in order to be effective. The critical feature of responsivity still needs further exploration; however, these results support the notion that even non-social responsivity can be effective in facilitating development.

Types of Infant-Environment Co-occurrences

In Piaget's discussion of circular reaction, most of the focus was on co-occurrences which consisted of the child's action on objects. Indeed, the subject's action and the response of objects is one type of subject-environment co-occurrence.

An example would be the shaking of the crib and the subsequent movement of the mobile. These co-occurrences are probably frequent in the child's environment and help to initiate and govern the child's means/end behavior, circular reactions and intentions as well as plans. Another subject-environment co-occurrence has to do with the subject's actions and the response of people. An example would be a child's vocalization and the mother's vocalization in response--or the child's cry and the father's picking the child up. This type of co-occurrence underlies the child's commerce with its social environment and perhaps can be distinguished in several ways from co-occurrences which exist between the child and objects.

In discussing these various types of co-occurrence, it should not escape our attention that some of them may be more likely to occur than others and even more to the point, that different co-occurrences have different outcomes in terms of the structural features of cognitive development. Exactly how these types of co-occurrences differ in terms of their potential effect on the child's cognitive structure remains in some doubt. We know very little about internal subject co-occurrences yet perhaps this type of co-occurrence is the underpinning of the infant's ability to detect, store and retrieve co-occurrences involving the social and object world. Both subject-object (Piaget, 1952) and subject-social environment (Bates, 1976) co-occurrences can be used to develop circular reactions and can be considered as necessary to the ultimate separation of means (actions) from ends (goals). The ability of both types of co-occurrences to influence early cognitive development depends on their consistency and frequency within the social or physical world. We will now consider some of the structural differences between subject-object and subject-other co-occurrences.

Co-occurrences in the Social and Object Worlds

An analysis of co-occurrence in the social and physical domains has not been explored, except for a few studies which have looked at object vs. person permanence (Bell, 1970). However, there do appear to be important differences in the frequency and logical/causal nature of co-occurrences which are social and co-occurrences involving objects. The social environment and the physical environment have different patterns of co-occurrence relative to the infant. The most frequent co-occurrences are those which involve the infant and its social environment rather than those involving the infant and the object environment.

The social environment initially produces more co-occurrences for two reasons. First, the people in the social environment have intentions focused on the infants' behavior and these intentions facilitate sets of co-occurrence between the infants' behavior and social consequences. Thus, people wish to and intend to respond to the child's behavior and their intention makes it very likely that the infant's action will produce a social consequence. These co-occurrences result not from the child's manipulation of some logical causal effect between an action and an outcome, but from the child's relationship to the social environment and the social environment's motive to respond. The second reason social co-occurrences predominate in the first month of life is that the infant's motor system is not initially sophisticated enough to enable the infant to obtain and manipulate physical objects.

Once the child is able to obtain and manipulate objects there still remains a fundamental difference between social and physical co-occurrences. The outcome of actions on objects has to do with the nature of the action and the nature of the object rather than with any intention on the part of the object. Balls roll when pushed, not because they intend to roll, but because they are round. On the other hand, social objects respond to infant crying, not through any logical necessity but through the motive on the part of the social object to be responsive to the infant's cry. On the one hand, it is the intention of the social world which produces the social co-occurrences while it is the structure of the physical world which produces physical co-occurrences.

While the intention of the social world makes social co-occurrences more frequent than co-occurrences between infant behavior and objects, it also makes social co-occurrences less predictable. Mother doesn't enter the room every time the infant cries; mother doesn't vocalize in response to every infant vocalization; the infant doesn't smile every time the mother says, "peek-a-boo." However, every time the infant makes contact with sufficient force the ball rolls; every time the rattle is hit against the bars of the crib it makes a sound. Thus, many action-object co-occurrences have a causal necessity and sufficiency which is lacking in social co-occurrences.

One final difference between social and physical co-occurrences has been noted by Brinker (1982). The temporal structure of social co-occurrences is most often sequential rather than simultaneous. Thus, there is a turn-taking or dialogue structure in which one person acts, the other person acts, the first person acts again, etc. (Bruner, 1975; Brazelton, Kozlowski & Main, 1974). Many physical co-occurrences, however, involve simultaneous infant actions and object events. For example, the consequences of shaking a rattle, banging a surface, mouthing an object occur at the same time the rattle is being shaken, the surface is banged, or the object is mouthed.

Co-occurrences for Handicapped Infants

Infants with handicaps which can be identified in the first 2 years of life are generally at-risk for further developmental problems. Handicapping conditions which can be diagnosed so early in a child's life generally have implications for impairments in processing information from both the physical and social environments. Since such conditions often involve impairments in motor functioning, the infant's ability to engage the physical environment is reduced. Furthermore, the early detection of handicapping conditions can affect parents' relationships with their child, parents' expectations for their child's development, and parents' styles of interaction with their child. Any one of these effects upon the family system could lead to a compounding of the infant's original developmental problems. Thus, various handicapping conditions could deprive an infant of contingency experiences through one of the following mechanisms:

1. Medical involvement decreases opportunity for social interaction (Klaus & Kennel, 1976; Vietze, Falsey, O'Connor, Sandler, Sherrod, & Aletmeier, 1980).
2. Parental attitudes and feelings may reduce the number of co-occurrences which the parents provide (Broussard & Hartner, 1970; Bell, 1980).
3. Limited response repertoire of some handicapped infants makes both social and object co-occurrences less likely (Brooks-Gunn & Lewis, 1979).
4. The ability to detect and remember co-occurrences may be limited for some handicapped children (Detterman, 1979).
5. Finally, a complex process of infant environment transactions progressively reduces the frequency of social co-occurrences.

Transactional Interpretation of Reduced Social Co-occurrences

The handicapped infant clearly has a role in shaping the mother's or father's behavior toward him. In a social system of reciprocal influences, parents' attempts to establish social contingency may simply be extinguished by the absence of adequate contingencies from their infants. Several authors' data support such a contention (Kogan, 1980; Jones, 1980). The nature of these inadequate contingencies for parents of handicapped infants ultimately will affect both the parents' initiations and their responsiveness to the infant. It is important to keep in mind in the course of this discussion that we do not wish to suggest that there is any endogenous pathology in parents of handicapped infants. Rather, we wish to point out the way in which handicapped infants might shape their parents to provide different rates of interactive bids and different rates of responsiveness.

Much of the available data on mother-infant interaction reflects qualitative differences in interaction when infants are matched on chronological age (Buium, Rynders, & Turnure, 1974; Marshall, Hegrenes, & Goldstein, 1973; Buckhalt, Rutherford, & Goldberg, 1978). Some of these differences are not evident when infants are matched on developmental age (Lewis & Wehren, in press) or on indices related to the specific interaction domain such as matching on a mean length of utterance in language interaction studies (Rondal, 1976; Leifer & Lewis, 1980).

Thus, interaction patterns are similar between normal mother-infant dyads and dyads involving a handicapped infant if the dyads are equated for developmental level. However, a key difference after handicapped infants are developmentally matched to normal infants is that they are older and hence their mothers have had a longer time to practice and settle into an interactive pattern. The amount of time which a mother of a handicapped infant has spent in a given pattern of interaction may make her less sensitive to the first signs of an infant's development which would ordinarily lead her to adopt a new set of expectations and a new interactive strategy. This "practiced mother" hypothesis suggests the slower rate of development in handicapped infants may produce a desensitization in the mother's ability to detect infant changes (Beveridge & Brinker, 1980; Brinker, 1982).

Jones (1977, 1980) reported several key interactive differences between Down's syndrome infants and their mothers emerge even when groups are matched developmentally with nonhandicapped dyads. The stream of behavior by Down's syndrome infants is not so cyclical as the behavior of normal infants. Thus, it is more difficult for mothers to see the waxing and waning of their Down's syndrome infants' behaviors and hence more difficult to structure their own behavior as a dialogue with their infant. This difficulty leads to more vocal clashes in which both parties are talking (Jones, 1977).

Jones (1980) also found dyads with a Down's syndrome infant had more eye contact in social approach and in eye contact games like peek-a-boo than developmentally matched normal dyads. However, the amount of referential looking to the mother after looking at an object by Down's infants was significantly less than for the normal dyads. Thus, it is more difficult for mothers of Down's infants to establish a topic of interaction. This would extend the finding that coordination of action and social schemes emerges only after social schemes are well established in contexts without objects and object schemes are well established in nonsocial contexts (Trevarthen & Hubley, 1978; Bricker & Carlson, 1980; Dunst, 1980).

A reasonable strategy to adopt under circumstances in which the infant prevents the mother from entering into object play and interaction would be to be very directive in one's interaction so that the infant would be placed primarily in the role of respondent. This in fact is the type of interactive difference between normal and handicapped mother-infant dyads which has been reported. The mothers of the handicapped infants appear to be taking charge of the interaction, to be less responsive to the infants' behavior, and to provide a greater amount of input to the child when compared to mothers of nonhandicapped infants of the same chronological or developmental age (Buium et al., 1974; Marshall et al., 1973; Buckhalt et al., 1978; Jones, 1980).

Interactive Differences and Social Contingencies: A Hypothesis

Based upon the mother-child interactive differences which we have reviewed we can now speculate upon the type of generalized expectancies about controlling the social world which a handicapped infant might develop. First, most situations in which the infant might control the parent's behavior would be clearly marked by the parent. A notable exception would be caregiving situations revolving around the infant's distress which would presumably be initiated by the infant. Secondly, within parent defined situations only specific activities which the parent was introducing would lead to a "predictable" pattern of parent responding. Mitchell (1980) has noted that 45% of the responses of preschool Down's syndrome children which matched a parent's demands were positively acknowledged by the parent. Presumably, for infants the percentage of feedback would need to be higher than 45% in order for them to acquire a generalized expectancy about their control of social events (Lewis & Coates, 1980).

The implication is that the behavior of handicapped infants leads their parents to adopt interactive strategies which ultimately reduce the number of contingencies to a few parent-defined situations. This would require the infant to develop a contingency awareness primarily through interactions with objects. Unfortunately, delays in motor development place severe limitations on the extent of object interaction. It is clear that a conscious effort would be required to engineer an environment so that simple forms of motor movement did produce consequences in objects. We will discuss such engineering of infants' environments subsequently.

The development of a generalized expectancy to control the physical and social world is clearly a potential problem for handicapped infants. Of the three kinds of co-occurrences discussed, the primary type which may not be affected as dramatically by handicapping conditions is the co-occurrence of internal events. The handicapped infant may be forced to rely on such internal co-occurrences to consistently experience control over the environment. Field (1980) found developmentally matched handicapped children differed from nonhandicapped children in that the handicapped children exhibited more behavior directed to self and less behavior directed to teachers and peers. Furthermore, within the handicapped population, chronologically older children who were developmentally matched to a younger handicapped population showed less behavior directed to others.

In summary, the handicapped infant is deprived of contingency experiences in both the social and physical realms. The interactive patterns which emerge between handicapped infant and parent are characterized by the greater direction which parents must assume. Handicapped infants therefore are placed increasingly in the role of respondent and very infrequently in the initiator role in which they define the topic of the interaction. This leads to an increased withdrawal from the social world with further reduction in social contingencies apart from situations defined by others for social contingencies.

A Process Approach to Discovering the Competent Handicapped Infant

Thus far, it has been shown that co-occurrences provide the grist for the mill of cognition. They affect an infant's state, attention, affect and memory. Handicapped infants experience fewer co-occurrences because of endogenous differences and because of the effect of these differences on the evolving interactional system between the infant and the social and physical world. The handicapped infant progressively becomes respondent rather than initiator, passive rather than active. In reviewing many of the available curricula for early intervention programs with infants and preschoolers, it appears that the handicapped child's role has also been that of passive respondent (Brinker, 1982; Brinker & Bricker, 1980; Brinker & Chatelanat, in preparation). One reason for this situation is infant interventionists have attempted to borrow from developmental psychology information about the content of development rather than information about the process of development.

An example from the content approach to developmental intervention would be teaching the infant to raise its head 45° when lying on its stomach (Wabash Center, 1972; Hanson, 1977; Forsberg, Neisworth, & Laub, 1977). Certainly the ability to control one's head in space is a prerequisite for the detection of many co-occurrences within the physical and social world. When this objective appears in the curricula cited above, the impression is that the infants would be given lessons in raising their heads from a prone position which would consist of several attempts per day to elicit this behavior during one practice session. While this may in fact be the most expedient way to teach infants to raise their heads when lying on their stomachs, it also teaches them that raising their heads is something which they do in response to certain external cues.

A process approach to the problem of head and trunk control would require simultaneous analysis of head raising in several physical positions. It would also require an analysis of the events to which the child oriented and attended, and the objects and people involved in such events. Thus, the motor components would be separated from the attention components in a process analysis of head raising while prone. This process approach, which requires a continual hypothesis-testing dialogue between assessor/teacher and the infant, provides information not only about whether a child can do a certain thing in a certain situation; it also provides clues as to how and why the child performs in this way. These clues should be useful guides to teaching other skills in other situations.

What emerges from the content approach to assessment and intervention is a list of things which the handicapped infant cannot do. However, we believe that a process approach to assessment and intervention which stresses what the infant can do is the key to unlocking the handicapped infant's "booming buzzing confusion" and discovering the competencies which are there.

Key elements of a process approach to assessment and intervention can be found in the work of Hauesserman (1958), Feuerstein (1979 a,b) and Sigel and Gallas (1979). The four elements which seem to be common within the process approach are the following.

1. There is an ongoing interaction between the assessor/teacher and the child involving a continuous progressive modification of task demands based upon the child's behavior.

2. The major goal of the assessment includes a description of how the child solved or attempted to solve the problem as well as whether the child solved the problem.

3. The description of how the child approaches and solves problems requires a characterization of the range of the child's abilities, including the best performance of the child and the child's performance in circumstances which are familiar to that child.

4. There is little distinction made between assessment and intervention since the construction of the profile of the child is an ongoing interactive process (as noted in 1).

First, from the process perspective the assessor approaches the child with a set of hypotheses in mind. These hypotheses are altered and reformulated as a function of the child's performance. Thus, assessment is a dynamic process in which the characterization of the child's abilities is an ongoing discovery (Bricker, 1976).

Second, the goal of assessment is to determine the underlying generative rules which gave rise to a particular response in a particular situation rather than to determine whether the response was correct vis-à-vis a predetermined norm. The meaning of the response for the child is critical rather than the presence or absence of the response (Lewis, 1967; Donaldson, 1978).

Third, the process perspective considers the nature of a particular response in terms of its place within a hierarchical set of skills. Thus, one must address whether the response is typical for that infant in that type of situation or whether it is atypical. If the response is atypical then one must question how and to what extent the situation is atypical for this infant. In short, a major task within a process approach is to determine how the infant's behavior varies as a function of the particular circumstances including the people present, the type of interaction, and the type of materials.

Fourth, the same response in the same context serves both to inform the assessment of the child and to determine the next phase of the curriculum. As such the behavioral distinction between assessment and intervention breaks down within the process approach (Filler, Robinson, Smith, Vincent-Smith, Bricker, & Bricker, 1975).

The Process of Contingency Intervention

The purpose of the Contingency Intervention Project is to provide handicapped infants with experiences of environmental events which co-occur with their behavior and thereby to produce in the infant a generalized expectancy to control the environment (Lewis & Goldberg, 1969) and to be aware of contingencies (Watson, 1966). This is accomplished by arranging a variety of consequences contingent upon simple actions which the infant is already capable of making. It is necessary to maximize the flexibility of contingency arrangements so that consequences which are attractive to a particular infant can be made contingent upon movements of which that infant is capable.

The cirriculum is designed to elaborate children's contingency awareness through three levels of complexity. The first level is to learn a specific response to control a specific consequence. The second level involves learning to produce either (a) sequences of the same response (i.e., different schedules of reinforcement) to produce the same consequence or (b) to produce the same response to produce different consequences. The third level involves learning a sequence of different responses to produce a combination of consequences. The steps in the curriculum cover the developmental range from primary circular reactions to simple means-ends behavior (Piaget, 1952). The concepts in this developmental hierarchy might be stated from the infant's point of view as the following:

Level I	(1) I can make things happen (but I don't know how I did it) - Primary Circular Reaction
	(2) I can do this repsonse to make this event happen - Secondary Circular Reaction
Level II	(3) This response can make a variety of different things happen - Elaboration of Secondary Circular Reactions
	(4) Other responses can make a variety of things happen - Elaboration of Secondaray Circular Reactions
	(5) These responses are tools for finding out what will happen - Coordination of Secondary Circular Reactions and their application to new situations
Level III	(6) Different combinations of responses lead to different kinds of information.

Normally this developmental hierarchy is completed by the end of the first year of life.

Level I of the curriculum begins with a search for these observable movements which an infant currently makes. For example, each of the infants involved in the project were first observed at their weekly intervention program or in their homes. During these visits it was determined (a) whether infants were moving their heads, arms, legs and hands, (b) whether they vocalized, (c) whether they spent any sustained amount of time looking at people and at objects, (d) whether they maintained contact with objects placed in their hands, (e) whether they demonstrated a visually directed reach. Through a combination of interviewing the infant's parents, observing the infant and presenting an infant with objects, we finally selected infants who did not demonstrate a visually directed reach and who showed little interest in the object world.

Level II of the curriculum is designed to challenge the expectancies which an infant has learned during the first level by producing within-session changes in the contingencies of reinforcement. The capacity of the microcomputer to do ongoing analyses of the infants' responses is particularly useful at this point. By changing a simple statement, the computer can be instructed to look for changes in response rate which would reflect habituation to the present contingencies (response decrements) or renewed excitement about the contingencies (response increments). When the computer detects such changes it can produce a change to a different type of co-occurrence (e.g., from visual to auditory) or a change in the response requirements for a specific co-occurrence. Thus, the microcomputer provides a dynamic interface which can progressively modify a contingency and prevent satiation from too long exposure to the same co-occurrence between behavior and environmental events.

Level III requires more elaborate associations on the infant's part. At this point the infant has to produce previously learned responses in a fixed sequence. For example, the infant will have to kick the foot panel and then pull the string in order to turn on a slide of the infant's mother's face. Pulling the string prior to kicking the panel produces no consequence. Hence the function of Level III is to teach the child to organize responses which had been means to separate ends into a sequence which would constitute a complex means to an end.

Method

Subjects. Twenty-two subjects ranging from 3.5 months to 4 years of age with moderately to severely handicapping conditions participated in the project for periods up to 6 months. Table 20 provides descriptive information about each child. The major characteristic common to all the children was that, at initial referral, they did not seem interested in physical objects in their environments and were not observed to consistently reach for or otherwise contact objects. Although some of these infants and young children exhibited some social responsiveness when tickled or jounced, they typically did not maintain visual regard for objects offered to them nor maintain their grasps on objects placed in their hands for more than a few seconds. In addition, each of the children exhibited a known genetic condition (Down's syndrome) or biological insult (e.g., inoperable brain tumor) and developmental delays ranging from mild to profound. All infants were referred to the program through infant stimulation programs.

Apparatus. The Apple II microcomputer system described in Chapter VII: Products, Section C of this report constituted the principle apparatus, and provided the mechanism for logical control of contingencies of reinforcement individually tailored to each child, data storage, retrieval, and analysis.

Table 20

Contingency Intervention Project Subject Roster

Child's Name	Medical Condition	Program Attended	Age at Initial Contact	Mental Age	Sessions Completed to Date
Rosa	Down's syndrome	Project Child of Mercer County	6.0 ms	---	27
Jennifer	Down's syndrome	Project Child of Mercer County	3.5 ms	2 ms	50
Troy	Developmental delay with spasticity equilibrium disorder & Hirschsprung disease	Project Child of Mercer County	12.5 ms	5 ms	27
Hugh	Down's Syndrome	Project Child of Mercer County	6.5 ms	---	18
Juliet	Down's syndrome	Project Child of Mercer County	4.0 ms	2.5 ms	39
Sian	Postnatal CA resulting in SQ with SZ and cortical blindness*	Mercer County NJRC Developmental Day Care	40 ms	2 ms	51
Tracy	SQ with Microcephaly	Mercer County NJRC Developmental Day Care	52 ms	2 ms	57
Mark	Perinatal CH, RH incompatibility Hydrocephaly with SQ	Mercer County NJRC Developmental Day Care	34 ms	2 ms	43

Table 20 (Cont'd)

Child's Name	Medical Condition	Program Attended	Age at Initial Contact	Mental Age	Sessions Completed to Date
Sally	Congenital Cytomeglio Virus with SZ and SH	Mercer County NJRC Developmental Day Care	29 ms	2 ms	44
Mary	Thalamic Astrocytome with mild apasticity	Mercer County NJRC Developmental Day Care	40 ms	2 ms	41
JD	Intrauterine Hypozia with AQ, SZ and microcephaly	Hunterdon Medical Center Child Development Program	10.5 ms	2 ms	6(dropped out due to illness)
Alyson	Intrauterine Hypoxia with SZ and spasticity	Hunterdon Medical Center Child Development Program	8.0 ms	2 ms	2(deceased)
Benjamin	Down's syndrome	Project Child of Mercer County	6.0 ms	5 ms	32
Ruth	Down's syndrome	Somerset County NJARC Infant	4.0 ms	2½-3 ms	10
Violet	Spastic Hypotonia and cataracts of unknown congenital origen	Project Child of Mercer County	13.0 ms	2 ms	30
Maggie	10 weeks premature/low birth weight with secondary hydrocephaly and CH resulting from Anoxia. At risk for CP and/or other dysfunction	Somerset County Infant Program	5.3 ms (3.0 ms corrected)	2 ms	22

Table 20 (Cont'd)

Child's Name	Medical Condition	Program Attended	Age at Initial Contact	Mental Age	Sessions Completed to Date
Mack	Same as above with retnolineal Fibroplasia resulting in probable visual impairment	Somerset County Infant Program	5.3 ms (3.0 corrected)	2 ms	22
Cliff	Myoclonic Seizure disorder of unknown etiology	Somerset County Infant Program	8.1 ms	2 ms	16
Joshua	Spastic quadriplegia and severe retardation resulting from accidental asphyyxiation at age 8 ms. Probable visual impairment	Somerset County Infant Program	32 ms	2 ms	20
Beth	Encapsulated Encephaloseal with secondary hydrocephaly	Project Child of Mercer County	3.0 ms	2.5 ms	8
Drew	Congenital hydrocephaly	Project Child of Mercer County			6
Melanie •	Seizure Disorder	Project Child of Mercer County			5

*AQ = Athetoid quadriplegia
CH = Cerebral hemorrhage
SH = Spastic hypotonia
SQ = Spastic quadriplegia
SZ = Seizures

The interface between child and computer-controlled consequences was accomplished by means of any one of several switches. Initially, two simple types of switch closures were used, an arm pull device and a kick panel. In response to the needs of the multiply handicapped children and infants with varying developmental levels, new switches or adaptations of those available from other sources were developed for use with the contingency intervention system. That we have been able to easily utilize any available switch with our system attests to its flexibility. Table 21 presents a brief description of each device.

Table 22 presents a list of consequences utilized as reinforcers in the contingency program. Not all devices were utilized with all subjects. Rather, consequences were selected according to the child's perceptual abilities and individual stimulus preferences (if any) which were apparent.

Procedure. Upon initial contact, infants underwent preliminary assessment which included Bayley Scales of Infant Mental Development, the Object Permanance, Means Ends, and the Development of Schemes Scales from the Ordinal Scales of Infant Development (Uzgiris-Hunt, 1975). A vidiotape of mother-infant interaction was also made. During this period, movements which the infants were capable of producing were identified. In all cases, movement of one of the arms or kicking the foot panel was selected as the initial response to be monitored.

All subjects began the program with a 3-minute baseline period in which no consequences were delivered for any response. During this period and in subsequent sessions,the target response and at least one other behavior were monitored. In subsequent sessions this second response served as a multiple baseline control with which to contrast changes in the reinforced response.

The contingency session followed the baseline period with a minimum of time intervening (about 30 sec.) required to load the contingency program from the disk.

During all sessions a predetermined consequence was contingent upon the target response. The contingency session lasted a maximum of 14 minutes. Sessions were terminated earlier for 30 seconds of continuous fussing or crying. Baseline sessions were subsequently conducted prior to any program change involving a new response (e.g., changing from an arm to a leg contingency). Program changes after the initial session were individually determined within the general framework specified by the curriculum plan. Consequence and other program changes were typically in effect for at least two sessions.

In addition to the automatic monitoring of switch closures by the computer, systematic observations of various social-emotional behaviors and attention were also recorded by an observer utilizing a six channel button box. Like the switch closures, all observational codes input directly into the computer. The observational codes have included the following behaviors:

I. Social/Emotional Behavior

1. smiles/laughs - corners of mouth withdrawn and turned upwards, either open or closed mouth. Vocalizations accompanying smiles are scored as laughs

Table 21

Switches Utilized in the Contingency Intervention Program

Device	Description of Activation
Arm Pull Lever	A downward pull on the (16 cm) lever accomplished by means of a ribbon attached to a velcro bracelet produces switch closure. Release of tension on the string opens the circuit.
Kick Panel	Deflection of a (20 x 23 cm) panel by either or both feet produces switch closure. The panel surface was carpeted and its angle adjustable.
*Barrel Switch	Rotation of a large colorfully patterned cylinder (18 x 8.25D cm) mounted on a wooden base activates the switch. A quarter turn of the cylinder accomplished by either hand is sufficient to produce closure. The switch could be mounted horizontally or vertically.
*Grasp Switch	A cloth covered cylinder contains a switch activated by grasp pressure (12.5 x 2.5D cm).
*Tilt Switch	A mercury switch enclosed in a small cylinder. Switch is taped to subject's limb and movements to a 75° angle results in switch closure.
*Touch Sensitive Joy Stick	Deflection of a red cylinder (9 cm) mounted in a blue base accomplishes switch closure. Switch could be positioned either horizontally or vertically.
Sucking Device	Suction on a nipple above a given pressure produces switch closure. Pressure setting is adjustable. Two levels (an upper and a lower limit) may be simultaneously set.
**Double Ping Pong Ball Switch	Deflection from any direction of either of two ping pong balls mounted in a 8" square base is sufficient to produce switch closure. A light tapping motion is sufficient.

*Switches available from Handicapped Children's Technological Services, Foster, R.I.

**Available from Rehab Engineering Center, University of Tennessee.

Table 22

Consequences Utilized in Contingency Intervention

Commercially Available Toys	Description
Tuneyville Choo-Choo	(TOMY #1006) Train with colorful rotating wheels, toots one of four nursery songs
Big John The Chimpee Chief	(Metro) Colorful big monkey, taps drum and whistles
Happy Hound	(Creative Creations #6871) Fuzzy mechanical dog, moves forward or barks
Visual Consequences	
Peek-a-boo	Black and white smiling schematic face pops up and disappears
Slides of smiling babies	Various colored, full face closeups
Light box with colored panel	Solid red or blue and white patterned panels lit from behind by 60 watt bulb
Psycho Light	(Radio Shack) Red lamp with vibrating wick
Continuous Loop Tapes	
Mothers' voices	Tapes of individual child's caretaker speaking to child or playing a typical nursery game/song
Music box	Tapes of child's music box, mobile or other toy
Favorite music	Selections of songs with which child is familiar e.g., mother's favorite Kenny Rogers - Lady Bee Gees - Saturday Night Fever Pointer Sisters - Happiness
Other tapes	Sesame Street Theme Parliament Wilton Felder Leo Kotke Flat & Scruggs Bruch Concerto Leon Redbone
Tactile Consequences	
Vibrator	
Fan	

2. cries/frets - a puckered face involving tightening of the muscles or wrinkling of the skin around the eyes, mouth and brows and/or repeated bursts of sounds usually of the same pitch (either high or low) in general state of dissatisfaction

3. vocalization (non-negative) - any sound produced by vibration of of the vocal cords in the absence of a smile

II. Attention

1a. Specific attention to manipulanda or consequences - looking at speaker or slide screen, looking at foot panel, looking at hand or foot to which manipulanda are attached, plus an alert quiet state.

1b. Head raising - lifting the head so that it is supported by the neck and the child's chin is off his/her chest or shoulder.

2a. Generalized activity - simultaneous movement of more than one limb or simultaneous movement of head and trunk and limb while attending to the consequence device.

2b. Any superstitious or exploratory behavior directed at some part of apparatus or contingency context.

3. Attends to interruption or extraneous stimulation - looks at person or object in room while not engaged in pulling or kicking manipulanda.

Social/Emotional Behaviors (I) are mutually exclusive and (II) attention behaviors are mutually exclusive. However, one social emotional behavior could occur simultaneously with one attention behavior. When a behavior in group I and/or a behavior in group II occur, the appropriate button(s) on the button box will be depressed for the duration of the behavior.

The observational channels have been defined for individual infants based on the movements made both in the intervention sessions or in the course of daily activity. Table 23 presents the types of switch closures and observational codes monitored for each child.

Table 23

Responses Monitored for Each Child in Contingency Intervention

Child	Responses Monitored		
Rosa	Arm	Smiling/laughing	
Jennifer	Leg	Vocalizing	
Troy	Attention	Cries/frets	
Hugh	Generalized activity		
Juliet	Distraction		
Sian	Leg	Smiling/laughing	Cries/frets
	Head raising	Vocalizing	
Tracy	Arm	Smiling/laughing	Cries/frets
Sally	Leg	Vocalizing	
Allyson	Head &		
	Gaze in direction of consequence		
Mary	Leg	Hands midline	Cries/frets
Cliff	Right arm	Smiling/laughing	
	Left arm	Vocalizing	
	Head &		
	gaze facing toward consequence		
Mark	Arm	Head banging	Vocalizing
JD	Leg	Smiling/Laughing	Cries/frets
	Head &		
	gaze facing toward consequence		
Benjamin	Right arm	Distraction	Barrel
Maggie	Left arm	Smiling/laughing	Toggle
Mack	Leg	Vocalizing	Grasp
	Attention	Cries/frets	Ping Pong
	Touches/explores switch without activating		
Violet	Arm		Smiles
	Leg		Cries
	Head & gaze facing toward consequence		Vocalizing
Joshua	Right arm	Coughs	General activity
	Left arm	Cries	
	Head & gaze faces consequence		
Beth	Leg	Smiling/laughing	
Melanie	Right arm	Vocalizing	
Ruth	Left arm	Cries/frets	
	Attention		

Table 23 (Cont'd)

Child	Responses Monitored	
Drew	Right arm	Distraction
	Left arm	Smiling/laughing
	Ping Pong	Vocalizing
	Attention	Cries/frets
	Touches/explores switch without activating	

Results

In addition to ongoing monitoring and analysis of the progress of individual children through the intervention program, overall analyses have focused on identifying general trends in learning within and across children. Thus far, analyses have focused on patterns of learning observed within subgroups of moderately and severely handicapped/delayed children. Hereafter, the results are organized according to the trends observed within each of these groups.

Patterns of Performance among Moderately Handicapped Infants

Eleven of the children seen in the intervention program can be characterized as moderately handicapped. Included in this group were six Down's syndrome children. Three of the children began the project as high-risk infants; of these, two (Maggie and Mack) are now known to have sustained some form of spasticity, the outcome for the third infant (Beth) is still indeterminate. Of the eleven, two of the infants (Mack and Drew) had some degree of visual impairment in addition to motor delays. However, their level of functioning despite this additional handicap is indicative of moderate developmental delay.

Table 24 presents a summary of contingency program results for this group. As can be seen from this summary, with one exception, these children:

(1) exhibited some developmental change over the period in which they were involved in the project;

(2) experienced and responded appropriately to a number of different contingencies;

(3) tended to respond to the arm and leg contingencies by rapidly accelerating the appropriate response usually within the first or second session;

(4) "graduated" from simple to more complex contingency problems.

All of these infants with the exception of Troy may be characterized as learners, although there were patterns of difference among the group.

Three of the Down's syndrome children (Rosa, Jennifer, and Benjamin) exhibited immediate differentiation of the reinforced from the nonreinforced response. The data for the initial acquisition sessions for arm pulls and leg kick responses for Rosa and Jennifer are presented in Figure 45. For these two children the reinforced response rate increased above the initial baseline level, while the nonreinforced response rate decreased below the initial baseline level. Thus, the reinforced response was consistently emitted at a higher level than the nonreinforced response. When the reinforcement contingencies were reversed, the pattern of responses also reversed with the previously nonreinforced response occurring more frequently than the reinforced response. Again, the change in the pattern of response was immediate and the new pattern was maintained across the session.

Table 24

Summary - Measures - Moderately Handicapped

	Observed Change in:							First Session in in Which Response Rate is 1.5 Times Base		
Child's Name	Bayley	Gain	Obj. Perm.	Means/ Ends	Scheme	Number Different Contingencies Attempted	Number Contingencies Showing Predicted Change in Target Response	Arm	Leg	Level of Curriculum Reached
Jennifer	Yes	7 ms	Yes	--	Yes	5	5	1	2	3
Hugh	--	--	--	--	--	3	3	1	1	2
Lauren	Yes	7.5ms	Yes	Yes	--	4	3	1	3	2
Rosa	Yes	--	--	--	--	3	3	1	1	2
Troy	No	0.5ms	--	--	--	4	2	4	3	1
David	Yes	5 ms	Yes	Yes	Yes	11	9	1	3	3
Maggie	Yes	6.5ms	Yes	Yes	Yes	5	3	1	2	3
Mack	Yes	4.5ms	Yes	Yes	Yes	6	6	1	1	3
Drew[a]	*	*	*	*	*	2	2	1	*	3
Ruth[a]	*	*	*	*	*	2	1	1	*	*
Beth[a]	*	*	*	*	*	4	3	1	1	3

[a] Though these infants have not yet been reassessed, a number of milestones have been attained and it is presumed reassessment will reflect these gains.

* Data unavailable as of this writing.

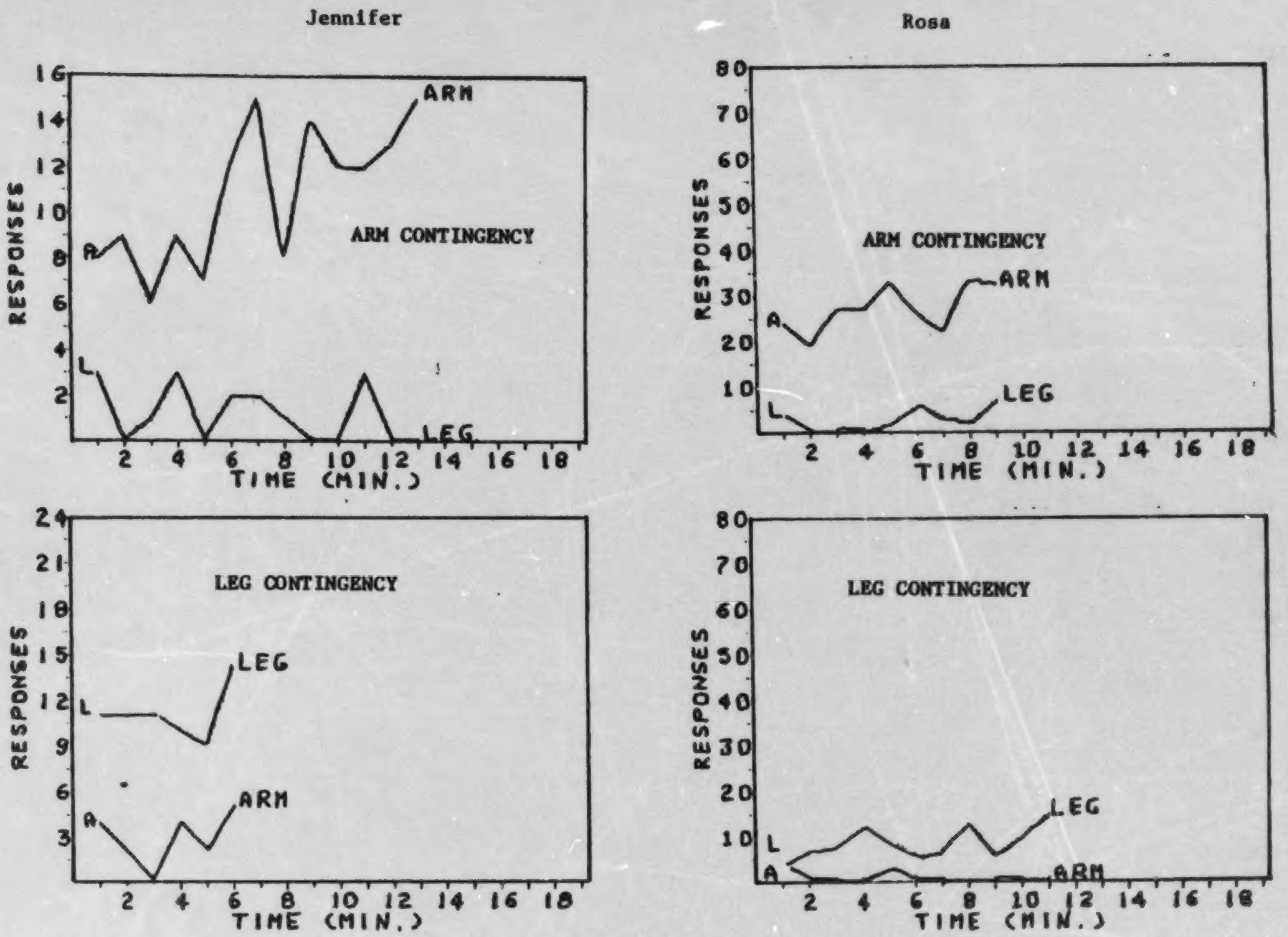


Figure 45. Down's infants showing rapid differentiation of reinforced from nonreinforced responses

As can be seen in Figure 46, Benjamin exhibited a similar pattern of response and immediately differentiated his arm and leg responses. The reinforced response, his right arm, increased above baseline (Figure 46a) and remained consistently above the nonreinforced leg response (Figure 46b) which remained relatively stable throughout the session. Benjamin was switched to a contingency for left arm movements and did not immediately differentiate the reinforced from the nonreinforced arm movement. However, the rate of overall left arm movement more than doubled from an average of 6 per minute to 14 responses per minute. On 7/21 the contingencies were reversed automatically after 5 minutes as shown in Figure 46c. Benjamin pulled with his left arm during the first 5 minutes when that response was reinforced, but rather quickly redistributed his responses when leg movements were reinforced.

Taken together, these results suggest that these children had generalized expectancies about their ability to control the environment and systematically varied their behavior to explore specific contingencies. In Piagetian terms, they had already developed some procedures to make interesting spectacles last—a characteristic of secondary circular reactions.

Three other children showed a gradual differentiation of the reinforced from the nonreinforced response. Data from selected sessions is presented in Figure 47 for Hugh and Juliet and for Ruth in Figure 48. These sessions revealed a gradual change in differentiation of reinforced leg response rate from non-reinforced arm response rate. For Hugh, the leg response rate did not remain clearly differentiated from the arm rate during leg contingencies. However, both Hugh and Juliet showed clear differentiation of arm and leg response rates during arm contingencies.

At present writing, Ruth is still involved in the intervention program. After three sessions in which a left arm response has been reinforced she has gradually moved from an initial increase in all monitored limbs to differentiation of left arm (see Figure 48).

The non-Down's syndrome children also exhibited differences in their pattern of learning. Beth (Figure 49) exhibited rapid and dramatic increases in the contingent response across arm and leg contingencies and was able to achieve within session reversal of response when the contingency was automatically changed by the microcomputer. In these respects her performance resembles that of the rapid learners (Rosa, Jennifer, and Benjamin). Mack and Maggie, low birth weight premature twins with differing degrees of cerebral hemorrhage resulting from anoxia, tended to be more gradual learners although each exhibited distinctive patterns.

Maggie, chronologically 3 months of age after correction for prematurity, was a temperamentally difficult child. Her initial sessions were characterized by intermittent fussing such that it was impossible to determine whether elevation of responses were attributable to learning or arousal. It was decided to allow Maggie the opportunity to "select" her own consequent event in the hope of identifying a consequence in which she was sufficiently interested, but did not overly arouse her. The microcomputer was programmed to present a menu of consequences for the same response, left arm movements. If a given consequence did not accelerate

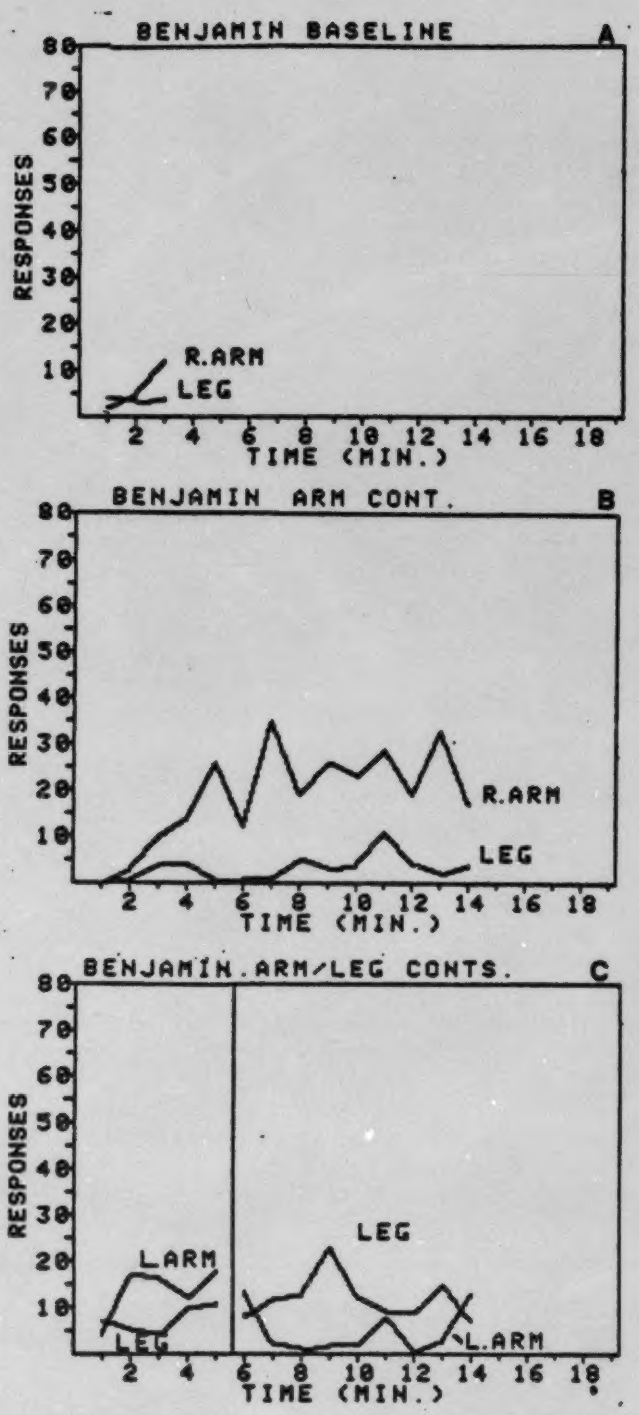
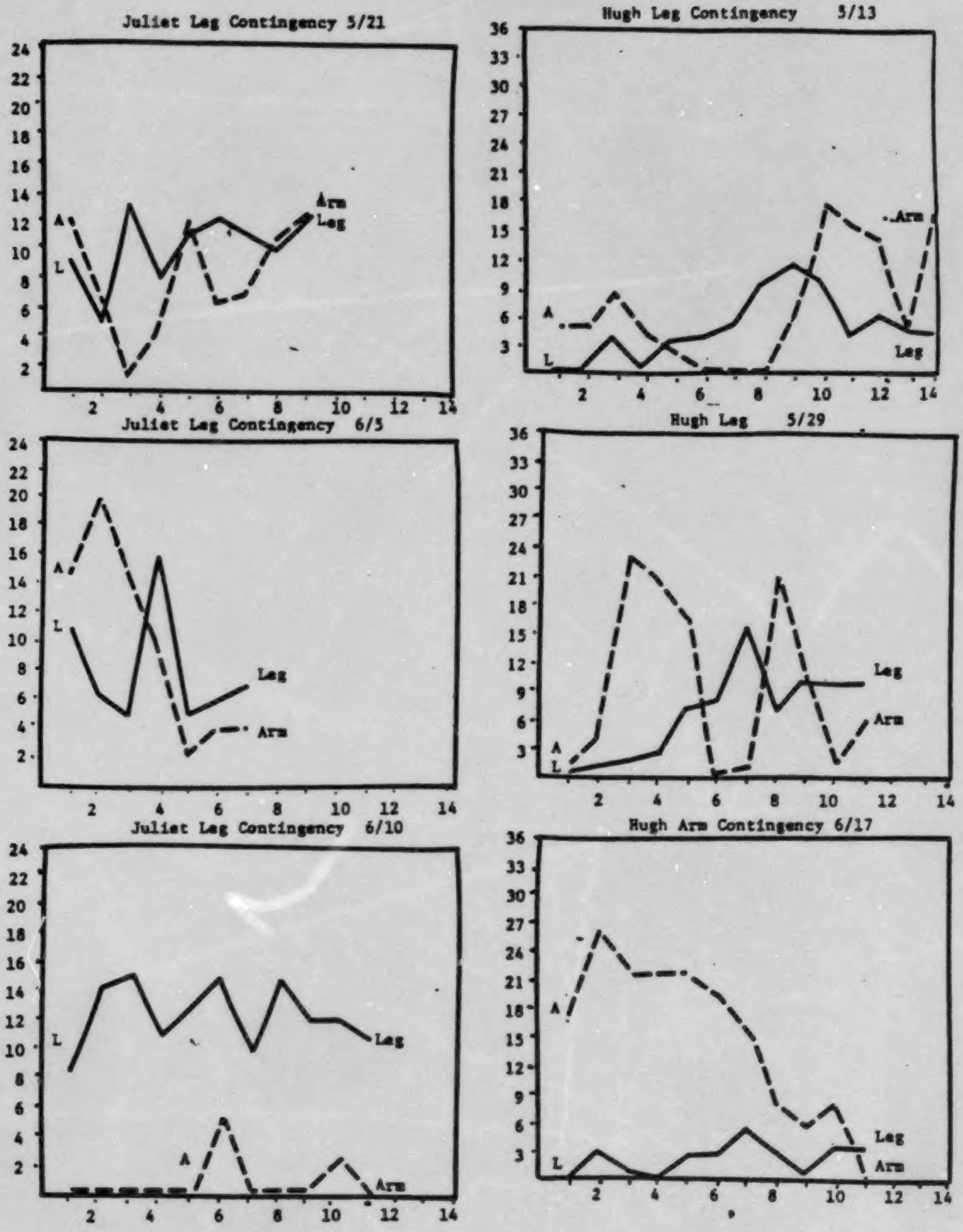


Figure 46. Learning curves for Down's Syndrome infant Benjamin.



Juliet Leg Contingency 5/21

Hugh Leg Contingency 5/13

Juliet Leg Contingency 6/5

Hugh Leg 5/29

Juliet Leg Contingency 6/10

Hugh Arm Contingency 6/17

Figure 47. Learning curves for Down's Syndrome infants Juliet and Hugh.

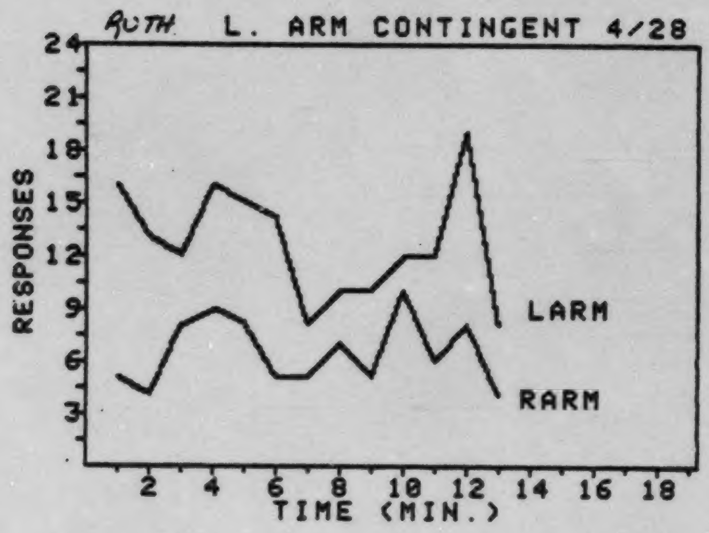


Figure 48. Learning curves for Down's Syndrome infant Ruth.

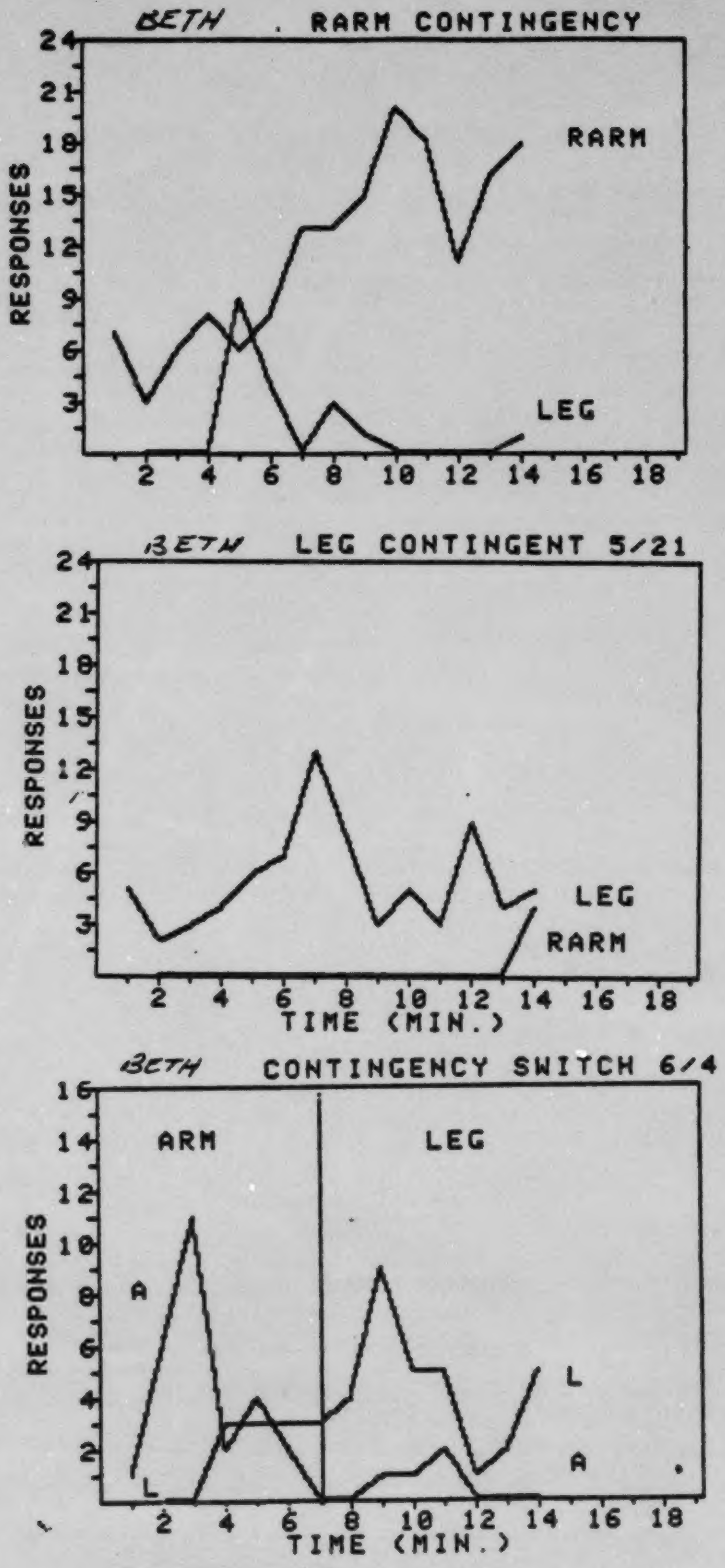


Figure 49. Learning curves for handicapped infant Beth.

the response above the baseline rate, then the computer automatically switched to a second consequence and a third, if necessary. The microcomputer switched after 2 minutes with each consequence if the criterion was met. The consequences were (1) a tape recording of the Sesame Street Theme song, (2) activation of a battery powered train (Mattel Tuneyville Choo Choo); and (3) presentation of a black and white peek-a-boo face. Figure 50 presents these data. Movement of the left arm with sufficient force resulted in a 4 second presentation of one of these consequences. Changing from one consequence to another was programmed when less than four left arm movements per minute occurred. The baseline response rate is depicted in the first panel of Figure 50a. The criterion was met with the Sesame Street music after two minutes, at which point the computer switched to the Tuneyville Choo Choo as a consequence. The rate of arm movement increased above the baseline rate and above the rate maintained by Sesame Street. However, after 5 minutes of experience with the Tuneyville Choo Choo, Maggie made fewer than 4 left arm movements in a minute and the computer changed the consequence to a schematic drawing of a face which popped up when she moved her left arm. Only three such consequences were planned for this session although the computer could have either been programmed to loop back to the first consequence after 2 minutes exposure to the pop-up face or present up to six additional selections in the menu. Based on Maggie's behavior, it was decides that the Tuneyville Choo Choo was the most reinforcing of the three consequences. Figure 50b shows that Maggie did learn to pull more frequently in the next session when the Tuneyville Choo Choo was the reinforcer throughout the session. Figure 50c presents data from the second session in which a leg contingency was in effect. Although the leg response accelerated over the first 5 minutes of the session, thereafter Maggie reversed to using an arm pulling strategy. This pattern was characteristic of the leg sessions.

Conversely, Mack, Maggie's more handicapped brother, appeared to learn a number of different contingencies easily and rapidly, with one exception. Mack originally began the intervention with an unknown degree of motor and visual impairment. It has been consistently found that use of the most frequent movement leads to more rapid acquisition and more rapid transfer of learning during Level 1. Mack, however, appeared to learn easily and rapidly with his nonpreferred arm, eliminating, then reversing the slight preference for his right to a new and strong preference for his left arm. Over the next several weeks, it became apparent that (1) we could not firmly establish learning with the originally preferred right arm, and (2) Mack had in fact sustained marked motor impairment to his right arm and shoulder, an impairment which became increasingly apparent as he developed his ability to reach and grasp with his good arm. It is interesting to speculate that Mack's detection of the more functional side of his body may have been facilitated by his contingency experiences both in and outside of our program, thus facilitating an early detection of his problem.

Figure 51 presents Mack's initial contingency session with his left arm (A), a typical session in which right arm responses were contingent (B) and the initial leg contingency session (C).

Drew was a child more developmentally advanced than our other subjects; he possessed a well-developed grasp but tended to use his right arm. We hoped to

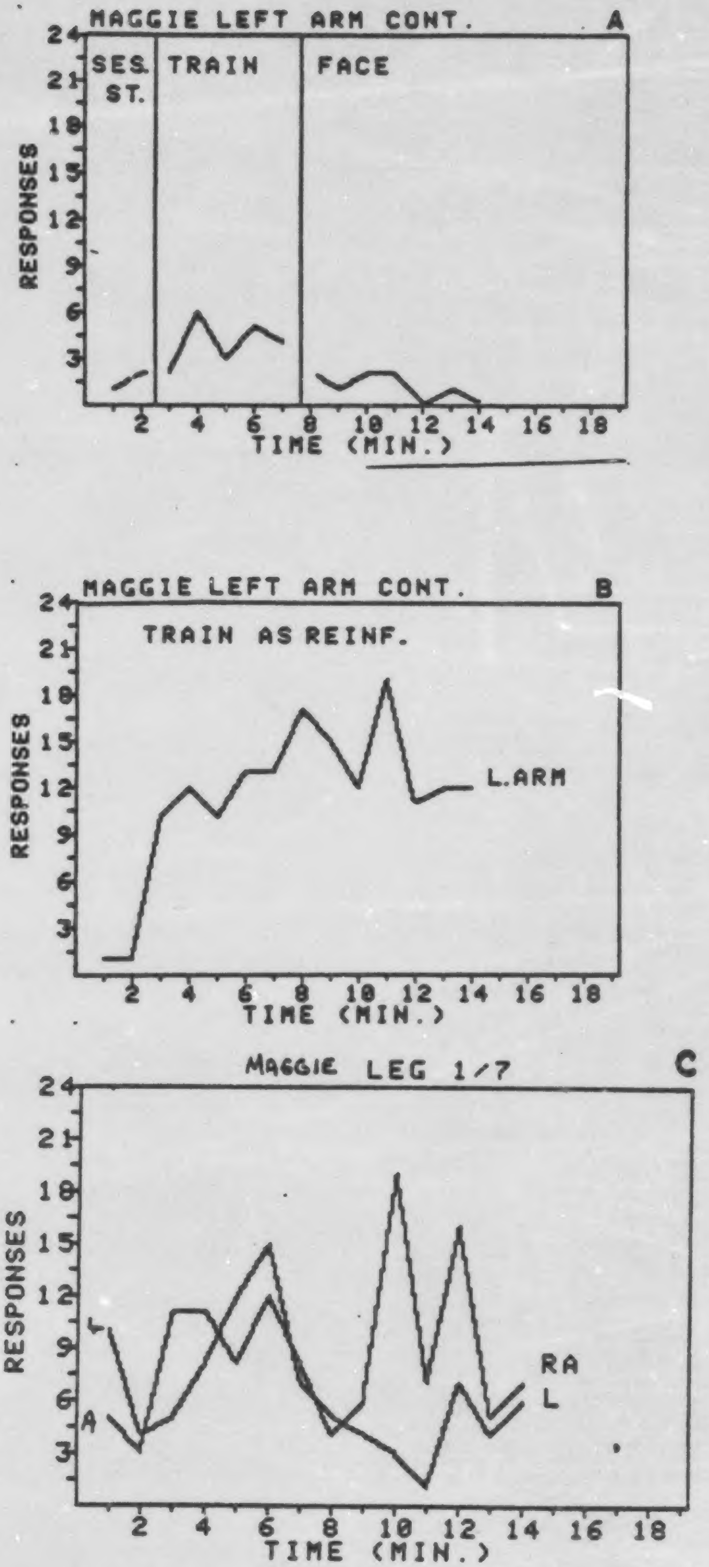


Figure 50. Learning curves for premature infant Maggie.

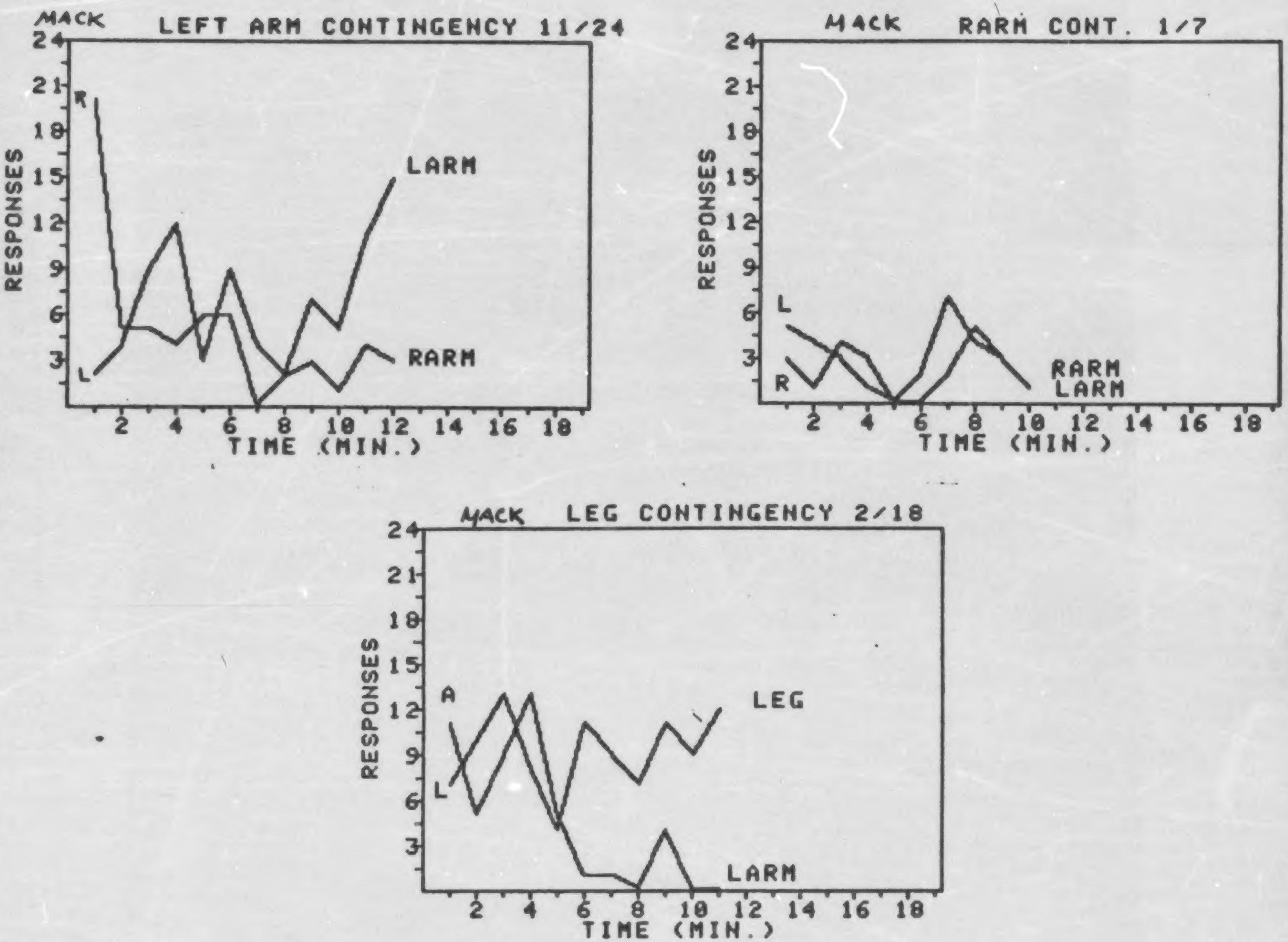


Figure 51. Learning curves for premature infant Mack.

introduce Drew quickly to the contingency apparatus and begin to explore more complex contingency problems using a tapping response more suitable for his age. Figure 52a depicts Drew's initial experience with a left arm contingency. The nearly vertical slope of the left arm curve suggests that Drew's performance was insightful. After just three arm pulls he recognized the contingency. Currently, we are working on a discrimination problem with Drew utilizing the dual ping-pong switch. Tapping the appropriate ball produces a consequence. In Figure 52b, Drew's first experience with this problem, the graph indicates that over the course of the session, responses of both red and white increased, but by the end of the session red was the dominant response, whereas white had been preferred previously.

Of the moderately impaired children, Troy showed no clear learning in spite of several efforts to achieve such learning. This child appeared interested in the learning situation and remained involved in it for 27 sessions, the average length of which was 12 minutes. Representative curves of his performance are reflected in Figure 53. Since Troy responded at a relatively high rate with both responses it is quite possible that some pattern of responses involving both manipulanda was adventitiously reinforced. Analyses are currently being undertaken to examine this possibility.

Patterns of Performance among Severely Handicapped Children

Twelve of the children who were seen in the intervention program can be characterized as severely impaired. Included in this group were two children, JD and Allyson, who for reasons of health, participated in too few sessions to permit any generalization about their performance. Table 25 presents a summary of contingency program measures for the remaining children, all of whom had severe multiple handicaps. As can be seen from the table, children in this group showed either small or no developmental change during the time that they were involved in the project. Overall, there was more variability in response to contingency among the severely handicapped. A number of patterns were again apparent.

Two of the children, Mark and Joshua, failed to exhibit any consistent evidence of learning. Joshua, a severely brain-damaged child of three, apparently acquired an arm pull contingency after eleven sessions. This session was characterized by rapid acceleration of the target response. However, in nine subsequent sessions there was no indication of either retention or reacquisition of the response. Mark's responding was also characterized by inconsistency. Mark experienced arm, leg and vocalization contingencies. In all cases, though there appeared to be acceleration of the appropriate response in some sessions, there appeared to be no consistent pattern in the acceleration either within or between sessions, and no deceleration of the response when the contingency was withdrawn (postsession baselines) or altered.

Among the children who did learn, the data are collapsed across sessions and presented in Figure 54. Sally learned to move her arm to produce a tape recording of music. The first curves on the left depict the arm and leg response rates. It is clear that although in the first session her arm response rate was lower, this response accelerated above the rate of kicking.

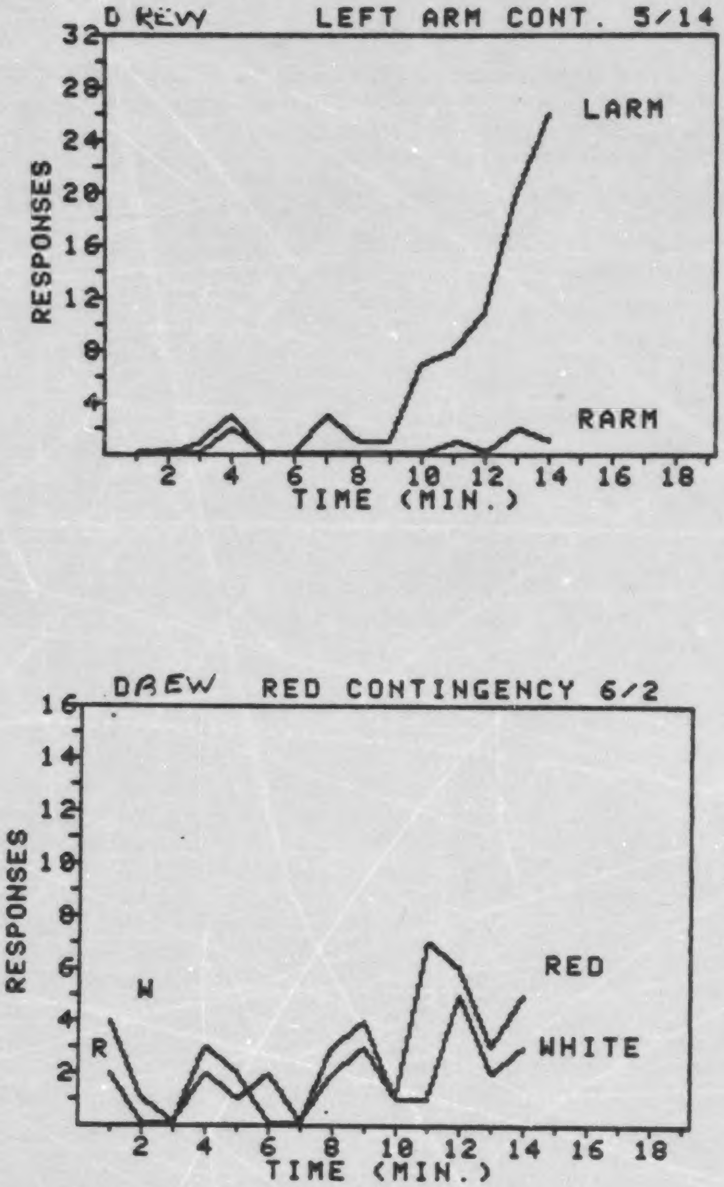
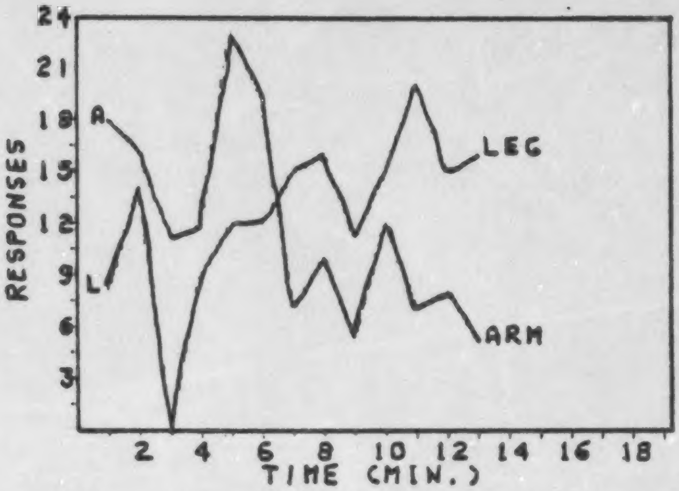


Figure 52. Learning curves for handicapped infant Drew.



TROY
ARM CONTINGENCY

Figure 53. Learning curves for handicapped infant Troy.

Table 25

Summary Measures - Severely Handicapped

	Observed Change in:						Number Showing Changes in Predicted Direction	Number of Sessions Differentiation of C/NC		
Child's Name	Bayley	Gain	Obj. Perm.	Means/ Ends	Schemes	Number Contingencies Attempted		Arm	Leg	Level of Curriculum Reached
Mary	No	--	Yes (Trans.)	No	Yes +1	4	2	3	1	3
Sally	Yes	1.5ms	Yes (Trans.)	Yes	Yes +1	5	3	2	3	3
Tracy	Yes	1.5ms	No	No	--	5	4	0	4	3
Sian	No	--	No	Yes	Yes +2	5	3	5 (Head up)	3	3
Mark	No	--	No	No	No	3	0	–	–	1
Cliff	Yes	1 m	Yes (Trans.)	Yes (Trans.)	Yes +1	2	2	1	1	2
Joshua	No	--	No	No	No	2	0	–	–	1
Violet	No		*	*	*	3	*	*	–	1
Melanie	*		*	*	*	2	*	*	–	*

*Data not available as of this date.

Subsequently, Sally was reinforced by tape-recorded music for kicking and by a musical mechanical toy for moving her arm. Both the rates of kicking and arm movement accelerated above the rates when only the arm had been reinforced. Although not depicted here, both responses accelerated above the baseline rates of 3 per minute for the arm and 2 per minute for the leg.

Tracy was reinforced for kicking by a recording of music. During baseline the rate of arm movement was less than one per minute while the rate of kicking was less than 3 per minute. After five sessions of contingency experience her rate of arm and leg movement had not changed. During the sixth session a tape of Tracy's mother's voice was introduced. Both response rates rose considerably beginning at the sixth session. At the thirteenth session, reinforcement was made contingent upon arm movement rather than kicking. The drop in rate of kicking suggests a clear differentation of the reinforced from the nonreinforced response.

Mary was first taught to move her right arm to produce tape-recorded music. Her right arm response rate rose from a baseline level of 3 to 4 per minute to a response rate of more than 6 per minute in sessions five and six. One effect of Mary's inoperable brain tumor has been general motor impairment which seems more severe on the left side of her body. For example, she will not usually track objects to the left and she shows little movement of her left hand. Up to the seventh session Mary generally held her left hand up next to her face with the fist clenched. In session seven, the contingency was reversed from the right to the left arm. The initial effect was that Mary moved her left arm to midline where she moved the left arm by using her right hand. By session ten however she began to move her left arm without the assistance of her right hand. The staff at the developmental day care center which Mary attends noted after these sessions that Mary seemed to have her left hand in midline a considerably greater proportion of the time.

Sian was initially reinforced for kicking by vibration of a motorized pad. During the initial baseline the rate of Sian's kicking was two per minute. Generally, in the classroom, Sian sat in a totally flexed posture with her head on her chest. During baseline the rate at which she raised her head off her chest was between 3 and 4 per minute. After three sessions the contingency for kicking clearly raised the rate of that response above baseline and above the rate of head-raising. The contingencies were then changed so that Sian was reinforced for raising her head. By the seventh session, the reinforced head-raising response was clearly differentiated from the kicking response. It is important to note that this and all other response differentiation found in the Contingency Intervention Project occurred without specific schedule restraints such as those which delay reinforcement when a nonreinforced response is emitted.

A graph of Cliff's performance depicting response rates per minute averaged across the duration of each session is found in Figure 55. Initially, right arm movement turned on either a tape recording of the Sesame Street theme song or a toy train which whistled a tune and rotated colorful wheels. In subsequent sessions, the introduction of either of these consequences maintained arm movements and generally increased his activity level as indicated

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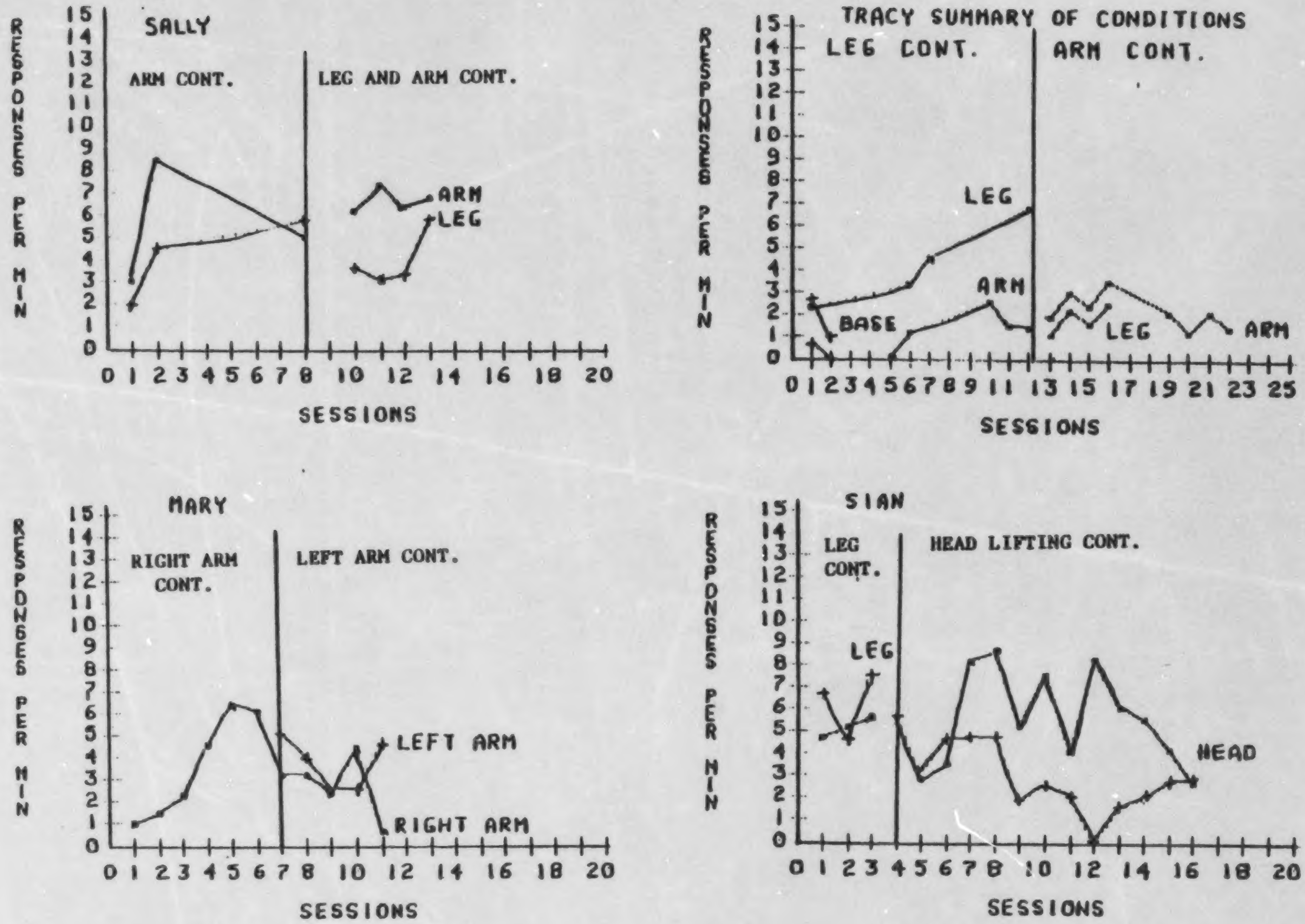

Figure 54. Learning by young profoundly retarded multiply handicapped children

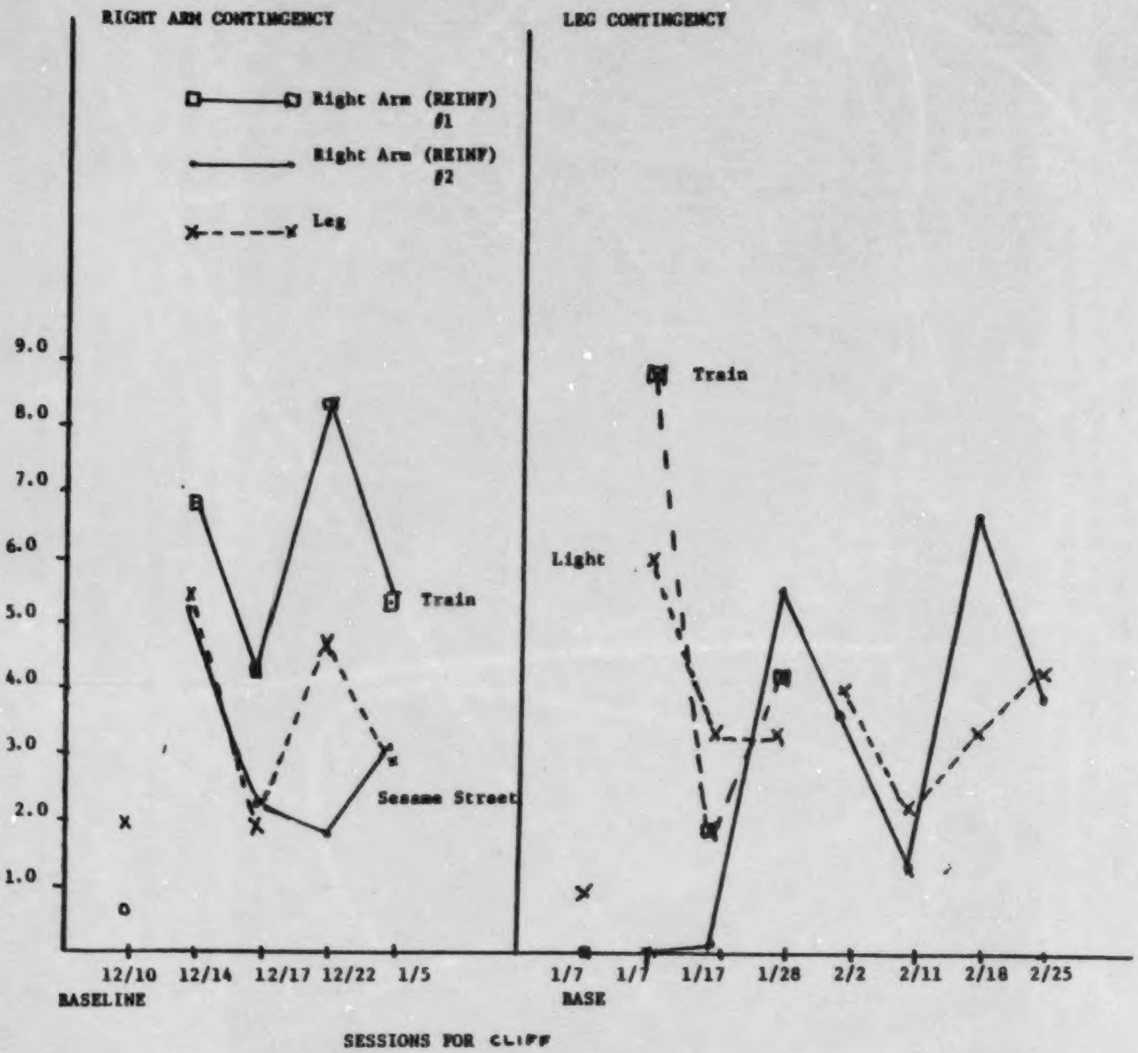

Figure 55. Learning curves for multiply handicapped infant Cliff.

by the increase in kicking. However, Cliff moved his right arm more consistently to produce the toy train consequence than to produce the music. This preference for the train was consistent across sessions although the order of consequences was counterbalanced.

On 1/7/82, another baseline session was conducted in which none of Cliff's movements produced a consequence. The contingency of reinforcement was switched so that kicking now resulted in activation of the consequence. Thus, on 1/7/82 Cliff was required to learn that (a) kicking now controlled the consequences and (b) right arm movements no longer controlled the consequence. First, the kicking response on 1/7/82 accelerated considerably above the kicking rate during baseline as well as above the kicking rate for any of the previous sessions during which right arm movements were reinforced. Right arm movements remained at the baseline rate and were considerably lower than during any of the sessions in which they had been reinforced. Finally, the preference for the train as a consequence was again clear. The rate of kicking when the train was the consequence was 9 kicks per minute in comparison to 6 per minute for a different consequence.

Unfortunately, due to illness there was a 10 day delay between the 1/7/82 session and the next session and another delay of 11 days between sessions. Thus, Cliff may have forgotten what he had previously learned. Alternatively, his general behavioral state was one of drowsiness and fussiness during the last several sessions. Work with Cliff was suspended due to his severe and recurring respiratory infections through the Spring.

Of the remaining two children, final data is not yet available. However, preliminary inspection suggests that Melanie has learned at least one contingency to date. Violet, a child with severe hypotonia, has produced less dramatic data, though there has been an apparent increase in activity across sessions. Further analysis of these data are in progress.

Discussion

The implications of the Contingency Intervention Project are several. First, handicapped infants as young as four months of age do learn simple operant responses with traditional discrete reinforcement schedules. Secondly, they and their parents and their teachers remain interested in the contingencies presented and will stay actively involved in learning sessions which have an average length of 11 minutes for up to six months.

Third, the patterns of learning evidenced by these children may have important implications for the way we assess handicapped infants. Although the issue is speculative at this point, there may be a relationship between these early patterns of development and more traditional forms of developmental assessment (e.g., Bayley Scales of Infant Development). Changes in Bayley scores have occurred thus far in all moderately handicapped infants who participated in the Contingency Intervention Project and for whom demonstrable learning occurred. For example, Jennifer and Juliet both learned the initial contingencies albeit at somewhat different rates. Their performance on the Bayley yielded MDI scores of 64 for Juliet and 62 for Jennifer (both at 4 months of age) immediately preceding the intervention while after intervention there was a moderate increase; Jennifer's MDI at 10 months was 79 after 50 intervention sessions, while Juliet's at 1 year was 70 after 39 sessions. Troy, on the other hand, showed no clear indication that he learned how to produce the consequences, while the two girls did. Troy's MDI was not calculable at the beginning or end of the project. His MA was 5 months at 13 months of age. After 27 contingency intervention sessions his MA was 5.5 months at 20 months of age. Values for all children are tabled (see Table 20).

Among the severely handicapped children small changes in developmental status either on the Bayley or Uzgiris-Hunt Scales occurred for all children to date for whom learning was apparent. Changes on Uzgiris-Hunt took the form of improved tracking of objects and may reflect increased motivation and interest. Sian, who had neither vision nor control of her arms, was observed to kick and push at objects. In addition to indicating generalization of a response from the intervention to other contexts, such behavior qualifies as a use of means to end and a simple motor scheme on Uzgiris-Hunt. Thus, the contingency intervention system may be an important assessment device. Moreover, the data produced by a dynamic assessment of learning and the consequences which produce learning would have more direct prescriptive utility than a static normative assessment (Brinker & Chatelanat, in preparation). This was particularly evident for the multiply handicapped children. While each of these children performed at the very bottom of the Bayley (MA = 2 months) their learning revealed unsuspected competencies. Feuerstein (1979 a,b) has emphasized the advantages of dynamic assessment over static normative assessment of older handicapped children. The contingency intervention system enables us to extend Feuerstein's logic down to include preschool children and infants.

The response of the multiply handicapped children was particularly interesting. First, both the parents and the teachers of these children were pleased at our interest in their children but expressed skepticism at the children's ability to learn. Our own observations of the children made it questionable whether they emitted enough voluntary movement of any sort which could be shaped into operant responding. The classroom behavior of these children suggested that they spent much of their time in the position in which they had been placed. Generally, they did not interact with the available objects or demonstrate any interest or motivation in other people or things.

We were surprised when Sian in a relatively short time clearly did more of the behavior for which she was reinforced and clearly detected changes in the contingencies of reinforcement. She also began to vocalize more in the early learning sessions. We were surprised when Mary began to use her previously conditioned right hand to move her left hand which had considerably more spasticity. We were also surprised when Sally and Tracy began smiling and laughing upon being placed in the contingency intervention seat and subsequently when they produced consequences. These surprises were based on dramatic differences in the behavior of these profoundly retarded multiply handicapped children.

Learned helplessness was a very accurate description of the behavior of children with such severe multiple handicaps. But, more importantly, contingencies between environmental events and behavior did result in an awareness and heightened interest in the world. The promise for the future is that once such awareness is established, increasingly complex explorations of the world can be arranged through the synergy of theory and technology.

Project History/Accomplishments

Year 1: (1) Selection of project staff.

(2) Preliminary design of curriculum and intervention plans.

(3) Literature reviews of technology and infants' learning begun.

Year 2: (1) Construction and pretesting of equipment and programs.

(2) Hiring and training of support personnel.

(3) Contacts with Program Directors of Early Intervention Programs established.

(4) Selection of responses and consequences based on data from contingency research project.

(5) Curriculum drafted.

Year 3: (1) Wave I begun (moderately handicapped sample).

(2) Preliminary analysis of Wave I.

(3) Equipment and program refinements.

Year 4: (1) Intervention system implemented with a sample of five children (Wave I) completed.

(2) Wave II, a sample of severely, multiple handicapped children begun.

(3) Apparatus and system components further developed and refined to maximize its effectiveness. Development or adaptation of several new switches to meet the needs of severely handicapped children and to test for generalizability of learning of new contexts.

(4) Detailed analysis begun on Wave I children.

(5) Preliminary analysis of Wave II (multiply handicapped) children.

(6) Dissemination of data and information regarding the project via presentations to professional associations, parent groups, and other interested parties. A list is provided in the Dissemination/Evaluation Section.

(7) Development of a collaborative relationship with Dr. Cordelia Robinson of the University of Nebraska Medical Center through the sharing of Contingency Intervention Project hardware and software.

Year 5: (1) Intervention system implemented with two additional waves of children (III and IV), including young infants and older multiply handicapped children.

(2) Piloting new apparatus and system components.

(3) Research papers and book chapters submitted for publication.

(4) Preliminary analyses begun on Waves III and IV children.

(5) Completion of data analyses of Waves I and II children.

(6) Collaboration in data collection, analysis and project dissemination with Dr. Robinson of University of Nebraska, Meyer's Children's Rehavilitation Institute.

2. Communicative Development Project

Overview

Nigel is a 23-month-old Down's Syndrome child. He has just returned from his language training session where he imitated the word "ball" and said "ball" when presented with a ball and asked, "What's this". Upon arrival in the classroom Nigel began looking for something to do. He saw a ball on the shelf out of reach. He pointed at the ball saying "Aah, aah". The teacher clearly understood his meaning and have him the ball.

Karen, a 28-month-old moderately handicapped child, was playing with a puzzle which she had chosen. She was wearing a radio microphone and observers were classifying her utterances and gestures into a variety of types of messages. Karen's mother was in the observation room with the observers who were doing a reliability check on their procedures. Karen held up a puzzle piece and said "a boo bo" while looking at another child. Both observers had classified this utterance as an example of babbling with no message intended. Karen's mother said, "She said 'a blue boat'". Sure enough the puzzle piece that Karen was holding was a blue boat.

Both of these examples involve messages which are not standard language forms. In the first case the intonation of the utterance, the gesture of pointing to the ball, and the fact that there was a clearly defined referrent made the message understandable. In the second case the phonological form was unclear and the referrent was unclear. Furthermore, the observers were not expecting a three word sentence from an utterance in which no individual words were clear.

Communication can take many forms and the forms which it does take will only partially determine the interpretability of the message. The interpretability of a message is the extent to which the message achieves the effect upon a listener which was intended by the speaker. Interpretability is a function not only of message forms but also of the extent to which a context is shared by the speaker and listener. A context is both physical and psychological. The physical aspects of a context include the objects and their relationships (e.g., a ball on the shelf and a child standing beneath the shelf, a blue boat which is a puzzle piece). The psychological aspects of the context determine the shared nature of that context. This sharing is a basis of the kinds of experiences which speaker and listener have had in similar contexts. Beveridge and Brinker (1980) have pointed out ". . . the child is developing an ever-increasing range of ways in which he participates closely with his mother in understanding the world. The mother and child respond to each other so sensitively as to make the child's world view an essentially joint construct. In other words, 'he sees that she sees what he sees.' . . . The process by which the child comes to rely less on the extra-linguistic context for communication is not clearly understood. Nor is the process by which mothers or members of the language community change their rules for interpreting a variety of forms of communication. However, along with these changes we assume there is also a change in the interpretability of messages." (p. 53-54)

Unfortunately most of the language intervention strategies for handicapped children have relied almost exclusively on descriptions of language forms rather than communicative functions (Brinker & Bricker, 1980). This often results in descriptions of the many things which handicapped children could not do rather than in a description of the communication system which works for them and the contexts in which it works. We would suggest that language intervention should begin with an understading of the child's existing communication system rather than with predetermined goals which may have no relationship to the child's existing communication system.

The purpose of the communicative development project will be to discover ways of building more complex communicative skills upon those skills which the child already possesses. This will involve a) describing the children's existing communicative systems, b) developing individualized intervention strategies based upon the functional communication system of the child, his/her parents, and other caregivers, c) implemention of the communicative intervention, and d) evaluation of the intervention. The first three of these steps will begin in April and May of 1980.

Methodology

Brinker has developed an observational system for studying the communication systems of young children prior to their use of syntactic structures (Brinker & Goldbart, 1979, in press). The purpose of this system is to provide a framework for classifying the social and communicative behavior of young children. The communicative behavior is classified in terms of its pragmatic or semantic functions. For example, Nigel's vocalization "aah aah" was used as an imperative to request the ball. A child saying the name of another child may simply say "Nigel". This statement could be used as an object word (that is Nigel); a possessive attribute (that belongs to Nigel); an action word (Nigel pushed it), etc. The context of the utterance determines the semantic category to which it is assigned.

The definitions of the behavioral categories are presented in the appendix. Within this observational system each category of behaviors, except the play codes, is recorded every time it occurs. Play categories are recorded every 15 seconds. Observers also write down the sounds and words which the children say.

During the initial phase of the Communicative Development Project a review of the literature on early communicative development was completed (Brinker, in press). One of the major developmental changes in the first two years appears to be the emerging ability to coordinate actions with objects and actions with people. Thus, initially either objects are explored and manipulated with the full attention of the infant or the infant focuses her full attention on interaction with other people. Gradually the infant begins to notice the role of others vis a vis objects and begins to use objects as part of an interaction with others.

The analysis of data on 28 preschool children (19 of whom were handicapped) which was proposed as part of the project has been delayed. The primary reason for this delay was the reduction in Dr. Brinker's time committment to the

Communicative Development Project as a function of the award of OSE contract #300-80-0638 to evaluate integrated educational services for severely handicapped children/youth. The data files for these analyses have been created and the analyses will be completed by the end of July, 1981.

The second phase of the Communicative Development Project has begun but at a reduced scale for the same reasons noted above. Three children from the Contingency Intervention Project have been visited monthly, their communicative systems have been described to the parents and intervention tactics have been mutually agreed upon and implemented. The data is currently being analysed.

Method

Subjects. The three children involved have been Juliet, Jennifer and Troy. Descriptions of these children are provided in the subjects section of the Contingency Intervention study. At the beginning of the Communicative Development Project their chronological and developmental ages were as follows: Juliet CA= CA = 12 mo. MA = 10 mo. MDI = 70; Jennifer CA = 10.5 mo. MA = 9 mo. MDI = 79; Troy CA = 20 mo. MA = 5.5 and MDI = not calculable.

Procedures. A combination of procedures were used to assess early communicative styles. First infants and their mothers were videotaped at breakfast. The mother was periodically asked to hold the spoon with food on it away from the infants mouth to elicit infant communication. The number of times which this occurred and the infant's communicative strategy for obtaining the food were rated from the videotape.

The mothers were then videotaped trying to get their infant to laugh and trying to get their infant to play with toys. The number of different ways they got their infant to laugh and the number of different activities in which they engaged their child with toys were recorded.

Two tasks described by Snyder (1980) were used. These tasks were designed to elicit declarative vocalizations. The first involved putting four of the same objects into a container (Juliet) or removing four objects from the container (Jennifer and Troy). After repetition of this task the child was given three of the same objects and the fourth object was different. In the second task the emperimenter modelled feeding a stuffed doll with a spoon. After demonstrating this the child was given the spoon. After getting the child to imitate the actions, a baby bottle was presented and the child's action recorded. Vocalizations upon presentation of the new object were noted as well as any different activity with the new objects.

Each child was observed in their normal daily activities. We asked the mothers to simply let the child do what they would normally be doing at that time of day. We also asked the mothers to carry on their own activities as close to their normal routine as possible. Although there certainly would be some changes of activity as a function of the observer's presence it is important to note that these mothers have been involved in the Contingency Intervention Project for a period ranging from six months to a year. Thus they were well acquainted with the observer and his presence in their home. During the "normal activity" observation the Brinker and Goldbart (1980) method was used.

Finally the mothers were asked four questions. These were:

1)What things make your child cry?

2)What words does your child understand?

3)What sounded words does your child make?

4)How do you know what your child wants?

Preliminary Results

Preliminary results (see Table 26) revealed that all three children are functioning within a preverbal communicative stage in which meaning depends primarily upon the listeners interpretations rather than upon clear behavioral, gestural and vocal coordinations. The majority of vocalizations were classified as per location for all three children.

Some consistencies were found in the variety of data collected. In free play, Troy had the fewest imperative and declarative vocalizations. At meals he had no clear coordination of actions directed to the mother in response to withholding food. For example, when a spoon of food was held in front of Troy he merely looked at it and kept his mouth open to receive it. He did not vocalize, look from the food to the mother, or in any other way try to get the food. This was in contrast to Jennifer's and Juliet's behavior when faced with the same situation. Troy's mother when interviewed indicated that he did not indicate his wants in any clear way. In addition, Troy was considerably delayed in development as measured by the Bayley.

The convergence of information regarding Troy's communicative development is encouraging. It suggest that it is possible to characterize a functional (in this case minimally) communicative system. Similar convergence of information was evident for Jennifer and Juliet. For example the second most frequent vocalization category emitted by Juliet during our observation was "cries". Juliet's parents report that the major clue to Juliet's wants are her refusals of objects offered to her and crying when she is tired of an activity.

The implications of these descriptions of communicative development will become clear only after we have a broader longitudinal picture of the children involved. The primary activities of the next year will be to collect these further data points and to determine patterns of communicative development for the children involved.

Accomplishments to Date

One review of the literature (Brinker, in press) has been prepared, data collection procedures have been devised and initial data has been collected on three children participating in the project. Discussion of the videotapes and data have been held with Dr. Jane Leifer, Dr. Margaret Sullivan, Dr. Miriam Kotsonis, and Ms. Lucille Weistuch in an effort to generate characterizations of the three children's communicative system.

TABLE 26

Communicative Behavior Observed at the Initial Data Point for Two Procedures

Vocalizations	Troy CA 20 mo MA 5.5	Jennifer CA 10.5 mo MA 9 mo	Juliet CA 12 mo MA 10 mo
Perlocutions	47 per hour	13.4	54.0
Imperative	3 " "	4.9	6.0
Declarative	1	2.4	7.0
Performative	8	1.2	4.0
Imitation	0	0	0
Cry	2	4.9	8.0
Laughs	8	4.9	4.0
Gestures			
Volitional	5	3.6	1
Recurrence	1	4.9	
Greeting	0	4.9	
Communicating at Breakfast	Total Opportunities 3	13	21
Looking only at food	1 (.33)	1 (.08)	0 (0)
Looking only at mother	1 (.33)		2 (.10)
Vocalization only	0	2 (.15)	1 (.05)
Vocalization + look at person	0	6 (.46)	3 (.14)
Vocalization + look at object	0	2 (.15)	6 (.28)
Vocalization + sequence of looking	0	1 (.08)	
No social or object directed resp.	1 (.33)		8 (.38)
Reach	0		0 (0)
Smiles	0	1 (.08)	1 (05)

3. Evaluation Project

The major goal of the Evaluation Project is to determine the effectiveness and feasibility of the detection, intervention, research and training activities of the Institute. Well-planned and executed evaluations yield important information on the success of a program, guidance for making necessary modifications in the program, and further, invaluable information to general public and funding agencies for determining the efficiency, feasibility, utility and importance of the program. Following is a brief outline of some of the methods which will be used to evaluate the Institute's projects and programs. Specifically, a table on each of the Institute's Projects is presented, each of wich includes the objectives of the Project, the actual activities under each objective, and the outcomes and evaluation of these activities.

TABLE 27

OBJECTIVES, ACTIVITIES, & OUTCOMES OF THE IDENTIFICATION PROJECT IN THE DETECTION UNIT

	OBJECTIVES	ACTIVITIES	OUTCOMES/EVALUATION
I.	Longitudinal study of a high risk sample of low birth weight infants (N=100).	1. Monitor birth weight and medical status of infants in high risk nursery.	1. Following of high risk sample for longitudinal study.
II.	Identification of control sample of normal birth weight (N=25).	1. Match full-term infants on independent variables for stratified sample.	1. Collect data on matched, stratified control sample.
III.	Coordination of medical and psychological assessment.	1. Contact medical team for medical assessment.	1. Infants seen by both medical and psychological staff.
IV.	Measurement of early infant information processing.	1. Collect data on attention measures.	1. Test discriminability of attention measures. 2. Comparison of high risk and normal infants on attention measures.
V.	Measurement of early infant cerebral lateralization.	1. Collect data on dichotic listening.	1. Test discriminability of dichotic learning. 2. Comparison of high risk and normal infants on dichotic listening.
VI.	Measurement of environmental variables.	1. Collect data on environmental variables. 2. Modify data collection procedures as necessary.	1. Test discriminability of environmental variables. 2. Comparison of normal and high risk infants on environmental variables.
VII.	Dissemination of study results	1. Analysis of study results completed.	1. Papers presented. 2. Articles and chapters published.

TABLE 28

OBJECTIVES, ACTIVITIES, & OUTCOMES OF THE COMPETENCY ASSESSMENT PROJECT IN THE DETECTION UNIT

OBJECTIVES	ACTIVITIES	OUTCOMES/EVALUATION
I. Complete CAP Handbook.	1. Analyze profile data.	1. Revisions of Handbook for use by program staff and (test manual) completed.
	2. Evaluation and alteration of measures for program use.	2. CAP Handbook completed.
II. Dissemination of information from CAP	1. Complete analysis of all CAP data.	1. Papers presented.
		2. Chapters & reports written and completed.
		3. Preparation of book on handicapped infants.

TABLE 29

OBJECTIVES, ACTIVITIES, & OUTCOMES OF THE PREMATURE INFANT FOLLOW-UP

	OBJECTIVES		ACTIVITIES		OUTCOMES/EVALUATION
I.	Identification of patterns of behavior that differentiate between categories of at-risk infants.	1.	Analyze all data.	1.	Comparisons made.
II.	Identification of patterns of behavior that differentiate between at-risk and normal infants.	1.	Analyze all data.	1.	Comparisons made.
III.	Dissemination of information.	1.	Analyze all data.	1.	Papers presented.

TABLE 30

OBJECTIVES, ACTIVITIES, & OUTCOMES OF THE CONTINGENCY RESEARCH PROJECT IN THE RESEARCH UNIT

OBJECTIVES	ACTIVITIES	OUTCOMES/EVALUATION
I. Identify effective outcomes of consequences which produce change in targeted infant responses.	1. Design & conduct study to identify nonsocial outcomes.	1. Identification of consequences or reinforcers to be used by Intervention Unit in infant skill training & contingency research. 2. Written report describing these outcomes to be submitted for publication this spring.
II. Determine if infant learning can be facilitated by contingency experiences.	1. Design & conduct a study on whether contingency facilitates learning in a similar situation. 2. Design and conduct a study on whether contingency facilitates learning in different situations.	1. Study of 1-year-olds and a longitudinal study conducted. 2. Report of rate of acquisition of new responses drafted.
III. Determine the effect of contingency experience to affective and state changes in the infant.	1. Design and conduct a study on the level of arousal and affect in infants who have experienced contingency learning. 2. Design study to assess effect of long term contingency on affect and arousal.	1. Data collected and preliminary analyses completed. 2. Comparison of affective responses pre- and post-test completed and reported in forthcoming chapter. 3. Comparison of affective responses of contingent and noncontingent groups completed. Results reporte in EPA paper and in a paper in preparation.

TABLE 30 (continued)

OBJECTIVES, ACTIVITIES, & OUTCOMES OF THE CONTINGENCY RESEARCH PROJECT IN THE RESEARCH UNIT

	OBJECTIVES	ACTIVITIES	OUTCOMES/EVALUATION
IV.	Determine the effect of contingency experiences on premature infants.	1. Design and conduct a study to assess affect and arousal in response to contingency experience by premature infants.	1. Compare affect and arousal of premature infants with normal infants' responses. 2. Written report of results was drafted.
V.	Determine age changes in contingency learning.	1. Design and conduct studies on infants of different age.	1. Evaluate age changes in contingency learning. 2. Written report of results to be submitted for publication.
VI.	Determine differences in patterns of learning between handicapped and normal infants.	1. Design and conduct study comparing learning patterns.	1. Evaluate patterns of learning. 2. Written report of results was drafted.
VII.	Dissemination of findings.	1. Analyses of study results completed.	1. Papers presented. 2. Articles and chapters written.

TABLE 31

OBJECTIVES, ACTIVITIES, & OUTCOMES OF THE PILOT RESEARCH PROJECTS IN THE RESEARCH UNIT

	OBJECTIVES	ACTIVITIES	OUTCOMES/EVALUATION
I.	Define parameters of development as related to perceptual-cognitive, social-emotional, and communicative abilities.	1. Design pilot study in each area. 2. Implement pilot study.	1. Written report on each pilot study. 2. Paper presentation on each study. 3. Staff evaluation of each study. 4. Working seminar on each study.
II.	Explore new methodologies in these areas.	1. Design of possible new research designs in these areas.	1. Recommendations for further research based on each pilot study. 2. Implications of each pilot study for new research designs.
III.	Dissemination of research findings.	1. Analyses for pilot studies completed.	1. Papers presented. 2. Articles and chapters written.

TABLE 32

OBJECTIVES, ACTIVITIES, & OUTCOMES OF THE INFANT ATTENTION PROJECT

OBJECTIVES	ACTIVITIES	OUTCOMES/EVALUATION
I. Examine the developmental course of performance on habituation tasks.	1. Collection of attention data completed.	1. Confirmations of test-related reliability of habituation assessment.
	2. Analyze habituation and recovery data to compare fixed trial and habituation criterion assessment.	2. Paper prepared.
II. Examine visual attention in premature infants.	1. Design of study.	1. Determine usefulness of attention measure for detection of at risk infants.
	2. Identification and testing of subjects.	2. Comparison of attention patterns in at risk population with those in normal population.
	3. Data collection and analysis.	3. Paper presented.
III. Dissemination of research findings.	1. Research results analyzed.	1. Papers presented.
		2. Articles and chapters written.

TABLE 33

OBJECTIVES, ACTIVITIES, & OUTCOMES OF THE CONTINGENCY INTERVENTION PROJECT IN THE INTERVENTION UNIT

	OBJECTIVES	ACTIVITIES	OUTCOMES/EVALUATION
I.	Provide contingency intervention to a small sample of handicapped infants from New Jersey.	1. Continue services to referrals.	1. Provide contingency intervention curriculum. 2. Evaluate effectiveness of intervention.
II.	Identify infant responses to be trained. Identify effective consequences for training.	1. Conduct studies specified under Contingency Research Project.	1. Contingency Research Project identification of infant responses and effective reinforcers. 2. Conduct contingency research with handicapped infants.
III.	Evaluate intervention unit by multiple assessment methods detailing child change in the areas of motor, cognitive, social, speech & language development.	1. Administer measures from CAP Battery upon entrance into program and during program. 2. Obtain direct and continuous data on target infant behaviors (e.g., head control) and on attention and social-emotional behaviors. 3. Parent report on infant behaviors.	1. Data comparing to infants' abilities to age-level norms. 2. Data on the effects of intervention program on child behavior change. 3. Case histories (demographic data, direct observations, parental interview, temperament, etc.) on sample infants. 4. Provide a written summary of child's progress to parents upon program completion.

TABLE 33 (continued)

OBJECTIVES, ACTIVITIES, & OUTCOMES OF THE CONTINGENCY INTERVENTION PROJECT IN THE INTERVENTION UNIT

	OBJECTIVES		ACTIVITIES		OUTCOMES/EVALUATION
IV.	Pilot manipulanda and social strategies with parents and teachers in infant programs.	1.	Implement contingency-intervention in home setting.	1.	Parent report data and observations on child change.
				2.	Parent and teacher report data on utility of equipment and strategies in traditional intervention settings - home and schools.
				3.	Evaluate home intervention and modify as necessary.
				4.	Provide parents with immediate feedback on child's session through graphics and discussion.
V.	Dissemination of research findings.	1.	Data analysis completed.	1.	Papers presented.
				2.	Articles and chapters written.

TABLE 34

OBJECTIVES, ACTIVITIES, & OUTCOMES OF THE PRODUCTS DEVELOPMENT PROJECT

OBJECTIVES	ACTIVITIES	OUTCOMES/EVALUATION
I. Extend use of equipment developed in contingency. intervention project.	1. Continue home testing. 2. Test apparatus in remote site.	1. Evaluate equipment design in the home. 2. Feedback to parents available immediately after collection via Apple II microcomputer. 3. Microcomputer programmed to change level of difficulty in contingency situations based upon response to a more simple situation. 4. Apparatus used and evaluated in remote site.
II. Dissemination of contingency intervention apparatus.	1. Brochure describing apparatus written.	1. Brochure disseminated.
III. Competency Assessment Handbook disseminated.	1. Final draft of Handbook completed.	1. Handbook to be published.
IV. Develop films and filmstrips showing development of normal, at-risk and handicapped infants.	1. Develop scripts. 2. Produce films/filmstrips.	1. Disseminate films/filmstrips.
V. Validation of scales: Developmental Knowledge Scale and Neurodevelopmental Scale.	1. Statistically verify scales.	1. Publish scales in professional journals.

TABLE 35

OBJECTIVES, ACTIVITIES, & OUTCOMES OF THE COMMUNICATIVE DEVELOPMENT PROJECT

OBJECTIVES	ACTIVITIES	OUTCOMES/EVALUATION
I. Determine methods of building more complex communicative skills upon skills the child already possess.	1. Design of study. 2. Identification of subjects. 3. Description of children's existing communicative systems. 4. Implementation of intervention.	1. Development of communicative intervention strategies. 2. Evaluation of intervention.
II. Dissemination of study findings.	1. Analysis of results completed.	1. Paper presented. 2. Articles and chapters written

TABLE 36

OBJECTIVES, ACTIVITIES, & OUTCOMES OF THE PREDOCTORAL & POSTDOCTORAL TRAINING PROJECT OF THE TRAINING UNIT

OBJECTIVES	ACTIVITIES	OUTCOMES/EVALUATION
I. Train pre-doctoral students from a variety of disciplines (educational psychology, special education, developmental psychology, & psycholinguistics) in assessment and research of handicapped infants.	1. Participation in seminars on medical, psychological and educational aspects of young handicapped children. 2. Design pilot study with handicapped children on some aspect of social-emotional, perceptual-cognitive, communicative or family development. 3. Implement pilot study.	1. Written report on pilot study. 2. Paper presentation on pilot study. 3. Staff evaluation of students' reports and progress.
II. Train post-doctoral students in assessment and research of handicapped infants.	1. Participation in seminars on medical, psychological, and educational aspects of handicapped children. 2. Design research study. 3. Implement research study.	1. Papers and presentations on research study prepared.

VII. PRODUCTS

Overview

One important Institute function is to advise professionals of the results of our research and to make the intervention techniques and assessment instruments developed available to them. The products generated through Institute activities fall into three general categories:

1) Publications in books and professional journals

2) Presentations at professional meetings

3) Intervention technology and assessment instruments

Lists of Institute publications and presentations follow. These research reports are grouped under three topical headings:

1) Detection, Assessment and Intervention with Handicapped Children

2) Socio-emotional Development in Normal and Handicapped Children

3) Cognitive, Linguistic and Perceptual Development in Normal and Handicapped Children

The instrumentation for the Contingency Intervention Project and the assessment instruments we have developed are described in the final section of this chapter.

These assessment instruments include the Competency Assessment Profile and accompanying Handbook, the Developmental Knowledge and Management Practices Scale, and the Neurodevelopmental Scale. Furthermore, a book on assessing children's emotions and a set of video films on early socio-emotional development of normal and handicapped children have been prepared.

A. PUBLICATIONS

Detection, Assessment, and Intervention with Handicapped Children

Books and Chapters

Brinker, R. P., & Lewis, M. Contingency intervention in infancy. In J. Anderson (Ed.), *Curriculum materials for high risk and handicapped infants*. Chapel Hill, NC: Technical Assistance and Development System, in press.

Brooks-Gunn, J. Evaluation of handicapped infants. In B. Frankel & R. Smith (Eds.), *Making the difference now: Programs for developmentally-delayed infants*. Trenton, NJ: New Jersey State Division of Mental Retardation, 1978.

Brooks-Gunn, J. Visual impairment: Research assessment. In M. Lewis & L. Taft (Eds.), *Developmental disabilities: Theory assessment and intervention*. New York: S.P. Medical and Scientific Books, 1982, in press.

Brooks-Gunn, J., & Hearn, R. Early intervention and developmental dysfunction. Implications for pediatrics. *Advances in Pediatrics*, 1982, in press.

Fox, N., & Lewis, M. The role of maturation and experience in preterm development. In J. Gallagher (Ed.), *New directions in special education*. San Francisco: Jossey-Bass, 1980.

Hanson, M. J. Down's syndrome children: Characteristics and intervention research. In M. Lewis & L. Rosenblum (Eds.), *The uncommon child: The genesis of behavior (Vol. III)*. New York: Plenum, 1981.

Lewis, M., & Brooks-Gunn, J. Developmental models and assessment issues. In N. Anastasiow, W. Frankenburg, & A. Fandal (Eds.), *Identifying the developmentally delayed child*. Maryland: University Park Press, 1982.

Lewis, M., & Brooks-Gunn, J. *The handicapped child: New directions in research and intervention*. New York: McGraw-Hill, 1982, in preparation.

Lewis, M., & Feiring, C. The impact of the family on the disturbed child's development. In J. Blacher-Dixon (Ed.), *Young severely handicapped children and their families*. New York: Academic Press, in preparation.

Lewis, M., & Rosenblum, L. (Eds.). *The uncommon child: The genesis of behavior (Vol. III)*. New York: Plenum, 1981.

Lewis, M., & Rosenblum, L. The uncommon as the common: A relative view (Introduction). In M. Lewis & L. Rosenblum (Eds.), *The uncommon child: The genesis of behavior (Vol. III)*. New York: Plenum, 1981.

Lewis, M., & Taft, L. (Eds.). *Developmental disabilities: Theory assessment and intervention*. Book from a Symposium on Developmental Disabilities in the Preschool Child: Early Identification, Assessment and Intervention Strategies, Chicago, September 1979. New York: S.P. Medical and Scientific Books, in press.

Lewis, M., & Wehren, A. The tyranny of the central tendency and other problems in the study of handicapped children. Paper presented at a conference entitled Handicapped and At-Risk Infants: Research and Applications sponsored by the Bureau of Education for the Handicapped, Asilomar, California, April-May, 1980. In D. Bricker (Ed.), *Application of research findings to intervention with at-risk and handicapped infants*. Baltimore, MD: University Park Press, in press.

Articles

Brinker, R., & Lewis, M. Discovering the competent handicapped infant: A process approach to assessment and intervention. To appear in *Topics in Early Childhood Special Education*, 1982, *2*(2), in press.

Brinker, R., & Lewis, M. Making the world work with microcomputers: A learning prosthesis for handicapped infants. *Exceptional Children*, in press.

Brooks-Gunn, J., & Lewis, M. Assessing the handicapped young: Issues and solutions. *Journal of the Division for Early Childhood*, 1981.

Brooks-Gunn, J., & Lewis, M. Screening and evaluating the handicapped infant. *Topics in Early Childhood Special Education*, 1982, in press.

Fox, N., & Lewis, M. Motor asymmetries in preterm infants: Effects of prematurity and illness. *Developmental Psychology*, 1982, *14*, in press.

Fox, N., & Lewis, M. Prematurity, illness, and experience: Factors for early experimentation. Submitted for publication.

Fox, N., & Lombardi, N. Neurodevelopmental assessment of the preterm infant. *Pediatric Research*, 1980, *14*, 433.

Lewis, M. The infant and its caregiver: The role of contingency. *Allied Health and Behavioral Sciences*, 1978, *1*(4), 469-492.

Socio-Emotional Development in Normal and Handicapped Children

Books and Chapters

Brooks-Gunn, J., & Lewis, M. The development of self-knowledge. In C. B. Kopp & J. B. Krakow (Eds.), The child: Development in a social context. Reading, MA: Addison-Wesley Publishing Co., 1982.

Brooks-Gunn, J., & Lewis, M. Early social knowledge: The development of knowledge about others. In H. McGurk (Ed.), Childhood social development. London: Methuen, 1978. Pp. 79-106.

Brooks-Gunn, J., & Lewis, M. Affective exchanges between normal and handicapped infants and their mothers. In T. Field & A. Fogel (Eds.), Emotion and interaction: Normal and high-risk infants. Hillsdale, NJ: Erlbaum, 1982, in press.

Brooks-Gunn, J., & Lewis, M. The development of the self. International Encyclopedia of Education, 1982, in press.

Brooks-Gunn, J., & Lewis, M. Mirror-image stimulation and self recognition in infancy. In L. Steinberg (Ed.), The life span: Readings in human development. New York: Columbia University Press, 1982, in press.

Brooks-Gunn, J., & Matthews, W. He and she: How children develop their sex role identity. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1979.

Brooks-Gunn, J., & Matthews, W. S. Sex role development. In I. E. Sigel & D. M. Brodzinsky (Eds.), Psychological development of the child. New York: Holt, Rinehart, and Winston, 1982, in press.

Edwards, C. P., & Lewis, M. Young children's concepts of social relations: Social functions and social objects. In M. Lewis & L. Rosenblum (Eds.), The child and its family: The genesis of behavior (Vol. II). New York: Plenum, 1979. Pp. 245-266.

Feiring, C., & Lewis, M. Changing characteristics of the U. S. family: Implications for family relationship and child development. In M. Lewis & L. Rosenblum (Eds.), Beyond the dyad. New York: Plenum, in press.

Fox, N. Assessment of the mother-infant interaction: A research design for clinical evaluation and intervention. In S. Harel (Ed.), Infants at risk. Excerpta Medica, The Netherlands, 1980.

Fox, N. Affective development in high risk infants. In N. Fox & R. J. Davidson, The psychobiology of affective development. Hillside, NJ: Erlbaum, in preparation.

Fox, N., & Davidson, R. J. The psychobiological substrates of affective development over the first two years of life. In N. Fox & R. Davidson, The psychobiology of affective development. Hillside, NJ: Erlbaum, in preparation.

Lewis, M. Situational analysis and the study of behavioral development. In L. Pervin & M. Lewis (Eds.), *Perspectives in interactional psychology*. New York: Plenum, 1978. Pp. 49-66.

Lewis, M. The social determination of play. In B. Sutton-Smith (Ed.), *Play and learning*. New York: Gardner Press, Inc., 1979. Pp. 23-33.

Lewis, M. Issues in the development of fear. In I. L. Kutash & L. B. Schlesinger (Eds.), *Pressure point: Perspectives on stress and anxiety*. San Francisco: Jossey-Bass, 1980.

Lewis, M. Self-knowledge: A social-cognitive perspective on gender identity and sex role development. In M. E. Lamb & L. R. Sherrod (Eds.), *Infant social cognition: Empirical and theoretical considerations*. Hillsdale, NJ: Lawrence Erlbaum Associates, 1980.

Lewis, M. The social network systems: Toward a general theory of social development. In T. Field (Ed.), *Review of human development (Vol. 1)*, in press.

Lewis, M. (Ed.). *Beyond the dyad*. New York: Plenum, 1982, in preparation.

Lewis, M., Brooks, J., & Haviland, J. Hearts and faces: A study in the measurement of emotion. In M. Lewis & L. Rosenblum (Eds.), *The development of affect: The genesis of behavior (Vol. I)*. New York: Plenum Press, 1978. Pp. 77-123.

Lewis, M., & Brooks, J. Infants' social perception: A constructivist view. In L. Cohen & P. Salapatek (Eds.), *Infant perception: From sensation to cognition*. New York: Academic Press, 1979. Vol. 2, p. 101.

Lewis, M., & Brooks-Gunn, J. Self knowledge and emotional development. Paper presented at a conference, The Origins of Behavior: Affect Development, Princeton, N.J., February 1977. Also in M. Lewis & L. Rosenblum (Eds.), *The development of affect: The genesis of behavior (Vol. 1)*. New York: Plenum, 1978.

Lewis, M., & Brooks-Gunn, J. *Social cognition and the acquisition of self*. New York: Plenum, 1979.

Lewis, M., & Brooks-Gunn, J. Toward a theory of social cognition: The development of self. In I. Uzgiris (Ed.), *New directions in child development: Social interaction and communication during infancy*. San Francisco: Jossey-Bass, 1979.

Lewis, M., & Brooks-Gunn, J. Self, other, and fear: The reaction of infants to people. In J. Belsky (Ed.), *The beginning: Readings in infancy*. New York: Columbia University Press, 1982, in press.

Lewis, M., & Brooks-Gunn, J. The self as social knowledge. In M. D. Lynch & A. A. Norem-Hebeisen (Eds.), *Self-concept: Concepts, development, correlates, and applications*. Cambridge: Ballinger Publishing Company, 1982, in press.

Lewis, M., & Brooks-Gunn, J. Social development of atypical infants. In M. Guralnick (Ed.), Social competence in handicapped infants. In preparation.

Lewis, M., & Feiring, C. The child's social world. In R. H. Lerner & G. D. Spanier (Eds.), Child influences on marital and family interaction: A life-span perspective. New York: Academic Press, 1978. Pp. 47-69.

Lewis, M., & Feiring, C. The child's social network: Social object, social functions and their relationship. Paper presented at a conference, The Origins of Behavior: The Social Network of the Developing Infant, Princeton, N.J., December 1977. Also in M. Lewis & L. Rosenblum (Eds.), The child and its family: The genesis of behavior (Vol. II). New York: Plenum, 1979. Pp. 9-27.

Lewis, M., & Feiring, C. Direct and indirect interactions in social relationships. In L. Lipsitt (Ed.), Advances in infancy research (Vol. 1). New York: Ablex, 1981.

Lewis, M., & Feiring, C. Some American families at dinner. To appear in L. Laosa & I. Sigel (Eds.), The family as a learning environment (Vol. 1). New York: Plenum, in press.

Lewis, M., Feiring, C., & Kotsonis, M. The social network of 3-year-olds: A developmental perspective. Chapter to appear in Beyond the dyad: The genesis of behavior (Vol. IV), Plenum, in press.

Lewis, M., Feiring, C., & Weinraub, M. The father as a member of the child's social network. In M. Lamb (Ed.), The role of the father in child development (2nd ed.). New York: Wiley, 1981.

Lewis, M., & Freedle, R. The mother and infant communication system: The effects of poverty. In H. McGurk (Ed.), Ecological factors in human development. Amsterdam, The Netherlands: North-Holland Publishing Company, 1977. Pp. 203-215.

Lewis, M., & Michalson, L. Children's emotions and moods: Theory and measurement. New York: Plenum, in press.

Lewis, M., & Michalson, L. Mother's labeling of infant affect. Chapter to appear in Emotion and interaction: Normal and high risk infants, T. Field & A. Fogel (Eds.). New York: Erlbaum, in press.

Lewis, M., & Michalson, L. The measurement of emotional state. In C. Izard (Ed.), Measurement of emotions in infants and children. New York: Cambridge University Press, in press.

Lewis, M., & Rosenblum, L. (Eds.). The development of affect: The genesis of behavior (Vol. 1). New York: Plenum, 1978.

Lewis, M., & Rosenblum, L. Issues in affect development. In M. Lewis & L. Rosenblum (Eds.), The development of affect: The genesis of behavior (Vol. 1). New York: Plenum, 1978.

Lewis, M., & Rosenblum, L. (Eds.). The child and its family: The genesis of behavior (Vol. II). New York: Plenum, 1979.

Lewis, M., & Schaeffer, S. The abused and neglected infant's social development. Paper presented at a conference, The Genesis of Behavior: The Uncommon Child, Princeton, N.J., March 1979. Also in M. Lewis & L. Rosenblum (Eds.), The uncommon child: The genesis of behavior (Vol. III). New York: Plenum, 1981.

Lewis, M., Sullivan, M. W., & Michalson, L. The cognitive-affective fugue. In C. Izard, J. Kagan, & R. Zajonc (Eds.), Cognition and affect. New York: Cambridge University Press, in press.

Lewis, M., & Zarin-Ackerman, J. Early infant development: The origins of social and intellectual development. In R. E. Behrman & J. M. Driscoll (Eds.), Neonatology. St. Louis: The C. V. Mosby Company, in press.

Matthews, W. S., & Brooks-Gunn, J. Social development in childhood. In A. Meyers & W. E. Craighead (Eds.), Cognitive behavior therapy for children. New York: Plenum, 1982, in press.

Articles

Brooks-Gunn, J., & Lewis, M. The effect of age and sex on infants' playroom behavior. Journal of Genetic Psychology, 1979, 134, 99-105.

Brooks-Gunn, J., & Lewis, M. "Why Mama and Papa?" The development of social labels. Child Development, 1979, 50, 1203-1206.

Brooks-Gunn, J., & Lewis, M. Infant social perception: Responses to pictures of parents and strangers. Developmental Psychology, 1981, 17(5), 647-649.

Brooks-Gunn, J., & Lewis, M. The development of early visual self-recognition. Developmental Review, 1982, in press.

Brooks-Gunn, J., & Matthews, W. S. How sex roles are established. Sesame Street Newsletter, Children's Television Workshop (Vol. 1), April 1981.

Feiring, C., & Lewis, M. The child as a member of the family system. Behavioral Science, 1978, 23, 225-233.

Feiring, C., & Lewis, M. Sex and age differences in young children's reactions to frustration: A further look at the Goldberg and Lewis (1969) subjects. Child Development, 1979, 50, 848-853.

Feiring, C., & Lewis, M. Temperament: Sex differences and stability in vigor, activity and persistence in the first three years of life. Journal of Genetic Psychology, 1980, 136, 65-75.

Lewis, M. The infant and its caregiver: The role of contingency. Paper presented at a conference on Infant Intervention Programs, The University of Wisconsin, Milwaukee, June 1977. Also in Allied Health and Behavioral Sciences, 1978, 1(4), 406-492.

Lewis, M. The self as a developmental concept. Human Development, 1979, 22, 416-419.

Lewis, M. Peer interaction and maltreated children: Social network and epigenetic models. Infant Mental Health Journal, 1980, 1(4).

Lewis, M. Play as whimsy. Human Brain & Behavior, 1981, in press.

Lewis, M., & Coates, D. I. Mother-infant interactions and cognitive development in twelve-week-old infants. Infant Behavior and Development, 1980, 3, 95-105.

Lewis, M., & Sullivan, M. W. Imitation in the first six months of life: Phenomenon in the eye of the beholder. Submitted to Child Development, January 1982.

Lewis, M., & Weinraub, M. Origins of early sex-role development. Sex roles, 1979, 5(2), 135-153.

Wasserman, G., & Lewis, M. Situations and situation transitions in maternal-infant interactive behavior. Journal of Genetic Psychology, in press.

Weinraub, M., Brooks, J., & Lewis, M. The social network: A reconsideration of the concept of attachment. Human Development, 1977, 20, 31-47.

Young, G., & Lewis, M. Effects of familiarity and maternal attention on infant peer relations. Merrill-Palmer Quarterly, 1979, 25(2), 105-119.

Cognitive, Linguistic, and Perceptual Development in Normal and Handicapped Children

Books and Chapters

Brooks-Gunn, J., & Weinraub, M. Origins of infant intelligence testing. To appear in M. Lewis (Ed.), *Origins of intelligence*. New York: Plenum, in press.

Cherry, L., & Lewis, M. Differential socialization of girls and boys: Implications for sex differences in language development. In N. Waterson & C. Snow (Eds.), The development of communication: *Social and pragmatic factors in language acquisition*. London: Wiley, 1978.

Feiring, C., & Lewis, M. Middle class differences in the mother-child interaction and the child's cognitive development. In T. Field (Ed.), *Culture and early interactions*. Hillsdale, NJ: Lawrence Erlbaum, 1981.

Feiring, C., & Lewis, M. Only and first born children and their mothers in the opening 2 years of life. Chapter to appear in *Decision-making, family planning and child-bearing*, G. L. Fox (Ed.). Berkeley, CA: Sage Publications, Inc., in press.

Feiring, C., & Lewis, M. First born and only children: Affective and cognitive development. In *The only child*, T. Falbo (Ed.). New York: Guilford Press, in press.

Hale, G., & Lewis, M. (Eds.). *Attention and cognitive development*. New York: Plenum, 1979.

Lewis, M. Attention as a measure of cognitive integrity. In L. Taft & M. Lewis (Eds.), *Developmental disabilities: Theory assessment and intervention*. New York: S. P. Medical and Scientific Books, in press.

Lewis, M. (Ed.). *Origins of intelligence: Infancy and early childhood* (2nd ed.). New York: Plenum, in press.

Lewis, M. On the nature of intelligence: Science or bias? Chapter to appear in M. Lewis (Ed.), *Origins of intelligence: Infancy and early childhood* (2nd ed.). New York: Plenum, in press.

Lewis, M., & Baldini, N. Attentional processes and individual differences. In G. Hale & M. Lewis (Eds.), *Attention and cognitive development*. New York: Plenum, 1979. Pp. 135-142.

Lewis, M., & Brooks-Gunn, J. Intelligence in the handicapped infant. In M. Lewis (Ed.), *Origins of intelligence*. New York: Plenum, in press.

Lewis, M., & Coates, D. Mother-infant interaction and infant cognitive performance. Paper presented at the 6th annual meeting of the International Primatological Society, Cambridge, England, August 1976. Also in D. J. Chivers & J. Herbert (Eds.), Recent advances in primatology: Behavior (Vol. 1). London: Academic Press, 1978. Pp. 125-130.

Lewis, M., & Fox, N. Predicting cognitive development from assessments in infancy. In B. Camp (Ed.), Advances in behavioral pediatrics (Vol. 1). Greenwich, CT: JAI Press, 1980. Pp. 53-67.

Lewis, M., & Starr, M. Developmental continuity. In J. Osofsky (Eds.), Handbook of infant development. New York: Wiley, 1979. Pp. 653-670.

Articles

Coates, D., & Lewis, M. Early mother-infant interaction and infant cognitive status as predictors of school performance and cognitive behavior in 6 year olds. Submitted for publication.

Fox, N. Lateral differences in preterm infant responsiveness and subsequent hemispheric specialization for language. International Neuropsychological Bulletin, 1979.

Fox, N., & Lewis, M. Hemispheric specialization for speech sounds: Term and preterm infant comparisons. Submitted for publication.

Fox, N., & Lewis, M. Auditory attention in three month preterm infants. Submitted for publication.

Fox, N., & Lewis, M. Three-month-old infants' responses to face-voice violation. Submitted for publication.

Fox, N., & Miner, C. Visual attention in preterm infants. Pediatric Research, 1980, 14, 433.

Leifer, J., & Lewis, M. Maternal speech to normal and handicapped children: A look at question-asking behavior. Paper presented at The International Conference on Infant Studies, New Haven, Connecticut, April 1980. Also in Behavior and Development, in press.

Lewis, M., & Brooks-Gunn, J. Attention and intelligence. Intelligence, 1981, 5(3), 1-2.

Lewis, M., & Brooks-Gunn, J. Visual attention at three months as a predictor of cognitive functioning at two years of age. Intelligence, 1981, 5, 131-140.

Lewis, M., & Enright, M. Development of intellectual abilities in the first three years of life. Submitted for publication.

Lewis, M., & Jaskir, J. Infant intelligence and its relationship to birth order and birth spacing. Infant Behavior and Development, in press.

Lewis, M., & Kreitzberg, V. The effects of birth order and spacing on mother-infant interactions. Developmental Psychology, 1979, 15(6), 617-625.

Lewis, M., & Michalson, L. Toy play as a function of familiarity, preference, and complexity. Submitted for publication.

B. PRESENTATIONS

Detection, Assessment, and Intervention with Handicapped Children

Appel, M., & Brooks-Gunn, J. *Intervention strategies for the young handicapped child*. Paper presented in a Symposium at the American Association Academy of Mental Deficiency meetings, Miami, May 1979.

Brinker, R. P. *A process approach to intervention in infancy.* Workshop in Special Education sponsored by Educational Testing Service, Princeton, N.J., October 1980.

Brinker, R. P. *Innovation in integration of severely handicapped and deaf-blind children*. Panel discussion at the Seventh Annual Conference of the Association for the Severely Handicapped, Los Angeles, October 1980.

Brinker, R. P. *Learning for its own sake: Contingency intervention in the first year of life*. Paper presented at the Annual Conference for the Handicapped Children's Early Education Programs, Washington, D.C., December 1980.

Brinker, R. P. *Confronting the challenges of 94-142 and section 504 in times of fiscal and political austerity.* Address to the Iowa Developmental Disabilities Disabilities Council and Civil Rights Commission. Workshop on Public Awareness and Consumer Responsibility, Des Moines, June 1981.

Brinker, R. P., & Deni, K. *Assessing low incidence severely handicapped populations.* Workshop for New Jersey Special Education Association, Bergen County, Special Education Unit, November 1980.

Brinker, R., & Lewis, M. *Patterns of learning by handicapped infants*. Paper presented at the biennial convention of the Society for Research in Child Development, Boston, April 1981.

Brinker, R., & Lewis, M. *Intervening in the motivational systems of handicapped infants: A process approach with product implications*. Paper presented at 59th Annual Convention of the Council on Exceptional Children, New York, April 1981.

Brinker, R. P., & Thorpe, M. *A national perspective on integration of severely handicapped children/youth in regular educational settings*. Symposium presented at the eighth annual convention of the Association for the Severely Handicapped, New York, October 1981.

Brooks-Gunn, J. *Strategies for assessing handicapped infants*. Symposia on Early Childhood Research with the Handicapped at the American Association for the Education of the Severely/Profoundly Handicapped, Baltimore, Maryland, October 1978.

Brooks-Gunn, J. Assessment and evaluation of the handicapped preschooler. Speaker at the Conference on Developmental Disabilities in the Preschool Child, Hightstown, N.J., June 1979.

Brooks-Gunn, J. Workshop presentation on Assessment and the Young Handicapped Child, Handicapped Children's Early Education Program Conference, Washington, D.C., December 1979.

Brooks-Gunn, J. Critical issues in visual impairment. Paper presented at a conference on Developmental Disabilities in the Preschool Child: Early Identification and Intervention Strategies, Chicago, September 1979.

Brooks-Gunn, J. The role of research in early childhood intervention. Educational Testing Service Seminar Series in Special Education, Princeton, N.J., October 1980.

Brooks-Gunn, J. Research on handicapped infants: From theory to practice. Paper presented at Educational Testing Service Seminar Series in Special Education, Princeton, N.J., November 1980.

Brooks-Gunn, J. New techniques for assessing the handicapped young. Handicapped Children's Early Education Program Conference, Washington, D.C., December 1980.

Brooks-Gunn, J. Research and intervention with young handicapped children. Educational Testing Service Seminar Series, Atlanta, December 1980.

Brooks-Gunn, J. Constructing a profile of the child in infancy. Paper presented in a Symposium on the Application of Developmental Principles to Handicapped Infants at the Council for Exceptional Children meetings, New York City, April 1981.

Brooks-Gunn, J. Child public policy for the 1980's. Keynote address at the New Jersey Symposium, Rutgers University, May 1981.

Brooks-Gunn, J. Facilitating infant development via intervention: Prevention and remediation models. Paper presented at an Aspen Institute Conference, Enhancing Human Development: The First Twenty Years of Life, The Aspen Institute, August 1981.

Brooks-Gunn, J. Temperament in the handicapped infant: Implications for intervention. Paper presented at the HCEEP Conference, Washington, D.C., December 1981.

Brooks-Gunn, J. Contingency research in normal and handicapped infants. Paper presented at a symposium at The American Association on Mental Deficiency, Boston, June 1982.

Brooks-Gunn, J., & Lewis, M. *Parents of handicapped infants: Their role in identification, assessment and intervention*. Paper presented at a Symposium on Parent-Child Interaction Findings and Their Implications for Education and Involvement, Chapel Hill, N.C., June 1979.

Fox, N. *The consequences of prematurity: The effect of maturation and experience on later development*. Paper presented at the International Congress and Workshop on the At-Risk Infant, Tel-Aviv, July 1979.

Lewis, M. *Interventions with handicapped infants: The process of applying theory*. Paper presented at the meeting of the American Association on Mental Deficiency, Boston, June, 1982.

Lewis, M., & Brooks-Gunn, J. *Logical problems in research with exceptional children*. Paper presented at a Symposium on Social and Cognitive Development in Down's Syndrome Infants at the International Conference on Infant Studies, New Haven, Connecticut, April 1980.

Lewis, M., & Wehren, A. *The tyranny of the central tendency and other problems in studying the handicapped child*. Paper presented at the Symposium, Conceptual and Methodological Issues in the Study of At-Risk and Handicapped Young Children. Society for Research in Child Development biennial meeting, Boston, April 1981.

Tucker, N., & Brinker, R. P. *Preschoolers' feelings about children with physically handicapping conditions*. Poster session, paper presented at the annual convention of the American Association on Mental Deficiency, San Francisco, May 1980.

Socio-Emotional Development in Normal and Handicapped Children

Brandt, L. Clinical assessment of the mother-infant interaction: Preterm-term differences. Paper presented at the International Conference on Infant studies, Austin, Texas, April 1982.

Brinker, R. P. Behavior problems: How can I help? Workshop sponsored by the Nebraska Department of Education, "Parents. . . getting involved with your child's educational future," Omaha, Nebraska, June 1979.

Brooks-Gunn, J. Stranger characteristics and appraisal. Debate on the Contribution of Social Dimensions and Interactional Variables on the Infant's Appraisal of Strangers. International Conference on Infant Studies meetings, Providence, R.I., March 1978.

Brooks-Gunn, J. Issues in social and cognitive assessment with handicapped infants. Workshop on Handicapped Infant Assessment at the International Conference on Infant Studies meetings, Providence, R.I., March 1978.

Brooks-Gunn, J. Chairperson of a Symposium on the Changing American Parent: Implications for Child Development at the Society for Research in Child Development meetings, San Francisco, March 1979.

Brooks-Gunn, J. The importance of mother-infant interaction to clinical practice. Paper presented at a Symposium on Evaluation and Clinical Application of the Mother-Infant Interaction at the American Academy of Child Psychiatry meetings, Atlanta, October, 1979.

Brooks-Gunn, J. The effect of maternal androgyny on mother-child interactions. Paper presented at the Southeastern Conference on Human Development, Alexandria, Va., April 1980.

Brooks-Gunn, J. Developmental changes in preferences of infants. Symposium on Maternal Behavior: Origins in Puberty? At the Society for Research in Child Development meetings, Boston, April 1981.

Brooks-Gunn, J. Temperament in the handicapped infant: Implications for intervention. Paper presented at the HCEEP Conference, Washington, D.C., December 1981.

Brooks-Gunn, J. Changes in the American parent: Implications for family-school relationships. Paper presented at the National Association of Elementary School Principals Annual meeting, Atlanta, March 1982.

Brooks-Gunn, J. Social and cognitive development in Down's syndrome children. Paper presented at a conference on Down's Syndrome: A Lifetime Learning Continuum, Freehold, N.J., June 1982.

Brooks-Gunn, J., & Lewis, M. Handicapped infants and their mothers at play. Paper presented at a Symposium on Handicapped Infants and Their Mothers at the American Psychological Association meetings, New York, September 1979.

Brooks-Gunn, J., & Lewis, M. The relationship of social and cognitive development in Down's syndrome infants. Paper presented at a Symposium on Social and Cognitive Development in Down's Syndrome Infants at the International Conference on Infant Studies, New Haven, Connecticut, April 1980.

Brooks-Gunn, J., & Lewis, M. Affective exchanges between mothers and their normal and dysfunctional infants. Paper presented at a Conference on Affective Displays of High-Risk Infants, Miami, December 1980.

Brooks-Gunn, J., & Lewis, M. Temperament characteristics of atypical infants. Paper presented at the Society for Research in Child Development meetings, Boston, April 1981.

Davidson, R. J., & Fox, N. EEG asymmetry during the perception of positive and negative affect in ten-month-old infants: Frontal versus parietal differences. Paper presented at the meetings of the Society for Research in Child Development, Boston, April 1981.

Feiring, C., & Lewis, M. Temperament: Individual consistency in vigor, activity, and persistence in the first three years of life. Paper presented at the Eastern Psychological Association meetings, Washington, D.C., April 1978.

Feiring, C., & Lewis, M. Changing characteristics of the U.S. family: Implications for family relationship and child development. Paper presented at the Ira J. Gordon Memorial Conference on Parent Education and Involvement, University of North Carolina, Chapel Hill, June 1979.

Feiring, C., & Lewis, M. Children, parents, and siblings: Possible sources of variation in the behavior of first born and only children. Paper presented at a symposium on The Cognitive and Social Consequences of Growing Up Without Siblings at the meetings of the American Psychological Association, Montreal, Canada, September 1980.

Feiring, C., & Lewis, M. First born and only children and their mothers. Paper presented at symposium on only children, American Psychological Association, Montreal, 1980.

Feiring, C., & Lewis, M. The social network of 3-year-old children. Paper presented at Society for Research in Child Development meetings, Boston, April 1981.

Feiring, C., & Lewis, M. The birth of a sibling: Effects on the mother-first born child interaction. Paper presented at a Symposium, The Effect of Siblings on Child Development at the Society for Research in Child Development meetings, Boston, April 1981.

Fox, N., & Davidson, R. J. EEG asymmetries in the perception of affective facial expression in ten month old infants. Paper presented at the meetings of the International Neuropsychological Society, Atlanta, January 1981.

Fox, N., Miner, C., Brandt, L., & Lewis, M. *The mother-infant dyad: A review of developmental research and presentation of a scheme for qualitative evaluation of the dyad*. Paper presented at the meetings of the American Academy of Child Psychiatry, Atlanta, October 29, 1979.

Fox, N. *Assessment of the mother-infant interaction: A research design for clinical evaluation and intervention*. Paper presented at the International Congress and Workshop on the At-Risk Infant, Tel-Aviv, July 1979.

Gaffuri, A. M., & Lewis, M. *How mothers leave their infants: Developmental changes in departure style*. Paper presented at the Eastern Psychological Association meetings, Philadelphia, April 1979.

Jaskir, J., & Lewis, M. *A factor analytic study of mother-infant interaction at 3, 12, and 24 months*. Paper presented at the Eastern Psychological Association meetings, New York, April 1981.

Levav, M., & Fox, N. *Early mother-high risk infant interaction: Effects of illness and maturity*. Paper presented at the meetings of the Society for Research in Child Development, Boston, April 1981.

Lewis, M. *Issues in the study of imitation*. Paper presented at a Symposium, Imitations in Infancy: What, When and How, at the Society for Research in Child Development meetings. San Francisco, March 1979. Also in ERIC's Resources in Education (RIE), #ED 171 394, October 1979.

Lewis, M. *The social network: Toward a theory of social development*. Fiftieth Anniversary invited address, Eastern Psychological Association meetings, Philadelphia, April 1979.

Lewis, M. *Self knowledge, gender identity, and sex role development*. Paper presented as a Masters' Lecture at the American Psychological Association meetings, New York, September 4, 1979.

Lewis, M. *Changing characteristics of the U.S. family: Implications for family relationships and child development*. Paper presented at a workshop at the Canadian Association for Young Children's meetings, Ottawa, Canada, October 26, 1979.

Lewis, M. *From emotional state to emotional expression.* Symposium on Human Development in the Perspective of Person and Environmental Interaction, University of Stockholm, Sweden, June 1982.

Lewis, M. *Interplay between cognitive and socio-emotional development*. Paper presented at the Conference on Facilitating Social and Emotional Development in Younger Multiply-handicapped Children. Sponsored by the Home of the Merciful Savor for Crippled Children, Philadelphia, June 1982.

Lewis, M., & Brooks-Gunn, J. *The ontogeny of self*. Paper presented at the Self-Concept Symposium, Boston, September 1978.

Lewis, M., & Brooks-Gunn, J. Antecedents of visual self recognition in infancy. Paper presented at the International Conference on Infant Studies, Austin, Texas, March 1982.

Lewis, M., & Michalson, L. From emotional state to emotional expression. Paper presented at the Symposium on Human Development in the Perspective of Person and Environment Interactions, University of Stockhold, Sweden, July 1982.

Lord, S., & Lewis, M. Sex and social class differences in infant play behavior. Paper presented at the Eastern Psychological Association meetings, Washington, D.C., April 1978.

Michalson, L., & Lewis, M. A cross-cultural study of parent expectations about infant development. Paper presented at the Eastern Psychological Association meetings, New York, April 1981.

Shapiro, J., & Brooks-Gunn, J. Temperament characteristics of handicapped infants. Paper presented at The Eastern Psychological Association meetings, Washington, D.C., March 1978.

Tucker, N., & Brinker, R. P. Preschoolers' feelings about children with physically handicapping conditions. Poster session, paper presented at the annual convention of the American Association on Mental Deficiency, San Francisco, May 1980.

Waite, L. H., & Lewis, M. Maternal report on social imitation development during the first year. Paper presented at the Eighth Annual Symposium of the Piaget Society, Philadelphia, May 1978.

Waite, L. H., & Lewis, M. Early imitation with several models: An example of socio-affective development. Paper presented at the Society for Research in Child Development meetings, San Francisco, March 1979.

Weistuch, L., & Lewis, M. Age as a social cognition. Paper presented at the Eastern Psychological Association meetings, New York, April 1981.

Cognitive, Linguistic, and Perceptual Development in Normal and Handicapped Children

Brooks-Gunn, J. *Attentional processes in the handicapped infant: Implications for intervention*. Workshop presented at the New Jersey Symposium, Rutgers University, New Brunswick, March 1978.

Brooks-Gunn, J. Moderator of debate on the cardiac response and behavior. International Conference on Infant Studies meetings, Providence, R.I., March 1978.

Brooks-Gunn, J. *Early attention, prediction and child evaluation*. Handicapped Children's Early Education Program Conference, Washington, D.C., December 1980.

Brooks-Gunn, J. *Attention, motivation and the young developmentally delayed child*. New Jersey Association of Learning Consultants' Symposium, Woodbridge, N.J., December 1980.

Brooks-Gunn, J., Lewis, M., & Bendersky, M. *Heart rate variability and attention in handicapped and normal infants*. Paper presented at the International Conference on Infant Studies, Austin, Texas, March 1982.

Coates, D. L., & Lewis, M. *Relationships between cognitive behavior at six years and mother-infant interaction at three months*. Paper presented at the International Conference on Infant Studies, New Haven, Connecticut, April 1980.

Fox, N. *Cardiac response to two types of auditory stimuli in preterm infants*. Paper presented at the meetings of the Society for Psychophysiological Research, Cincinnati, October 1979.

Fox, N. *Lateral differences in preterm infant responsiveness to auditory stimuli and subsequent hemispheric specialization*. Paper presented at the International Conference on Infant Studies, New Haven, Connecticut, April 1980.

Fox, N., & Lewis, M. *Lateral differences in preterm infant responsiveness and hemispheric specialization for language*. Paper presented at the meetings of the International Neuropsychological Society, San Francisco, January 1980.

Hartka, E., Brooks-Gunn, J., & Lewis, M. *Age changes in contingent learning*. Paper presented at the Eastern Psychological Association meetings, New York City, April 1981.

Hawryluk, M. K., & Lewis, M. *Attentional patterns in infants with Down's syndrome: A preliminary investigation*. Paper presented at the Eastern Psychological Association meetings, Washington, D.C., April 1978.

Hernandez, A., & Fox, N. Cardiac orienting response and habituation/dishabituation in term and preterm infants to pure tone stimuli. Paper presented at the meetings of the Society for Research in Child Development, Boston, April 1981.

Hernandez, A., & Fox, N. Autonomic control in preterm infants: Effects on attention. Paper presented at the meetings of the Society for Psychophysiological Research, Washington, October 1981.

Hernandez, A., & Fox, N. Development of autonomic control in term and preterm infants from birth to three months. Paper presented at the meetings of the International Conference of Infant Studies, Austin, Texas, March 1982.

Kreitzberg, V., & Lewis, M. A factor analytic study of the Bayley Mental Scale of Infant Development. Paper presented at the Eastern Psychological Association meetings, Washington, D.C., April 1978.

Lao, J. Visual attention in preterm infants: Effects of illness and maturity. Paper presented at the International Conference on Infant Studies, Austin, Texas, April 1982.

Leifer, J. S., & Lewis, M. Maternal question-asking behavior: A longitudinal analysis. Paper presented at the Eastern Psychological Association meetings, Washington, D.C., April 1978.

Leifer, J. S., & Lewis, M. Responding to questions: A longitudinal analysis. Paper presented at the summer meeting of the Linguistic Society of America, Urbana-Champaign, Illinois, July 1978.

Leifer, J., & Lewis, M. The maternal response component: Mothers' linguistic behaviors following child responses. Paper presented at the Eastern Psychological Association meetings, Philadelphia, April 1979.

Leifer, J., & Lewis, M. Maternal speech to normal and handicapped children: A look at question-asking behavior. Paper presented at The International Conference on Infant Studies, New Haven, Connecticut, April 1980.

Lewis, M. Issues in the study of imitation. Paper presented at a symposium, Imitations in Infancy: What, When and How, at the Society for Research in Child Development meetings, San Francisco, March 1979. Also in ERIC's Resources in Education (RIE), #ED 171 394, October 1979.

Lewis, M. Developmental principles and educational practice. Paper presented at the invited 1979 Pickering Lecture sponsored by the Department of Psychology, Carleton University, Ottawa, Canada, October 26, 1979.

Schwartz, W., & Lewis, M. Infant intelligence and its relation to birth order and birth spacing. Paper presented at the Eastern Psychological Association meetings, Philadelphia, April 1979.

Stoltz-Loike, M. Three-month-old infants' responses to face-voice violation: Effects of illness and maturity. Paper presented at the International Conference of Infant Studies, Austin, Texas, April 1982.

Stoltz-Loike, M., & Fox, N. Infant cardiac response to visual and auditory stimuli varying in temporal pattern. Paper presented at the meetings of the Society for Psychophysiological Research, Washington, October 1981.

C. INTERVENTION TECHNOLOGY AND ASSESSMENT INSTRUMENTS

Contingency Intervention Instrumentation

The Products Development Project provides technical details of all equipment being utilized in the contingency intervention project. In addition to making the details of existing apparatus available, the products development project explores simplifications of equipment to make it available for home use without requiring the assistance of project staff. Such development is contingent upon clear demonstrations of the beneficial effects of the contingency intervention project.

The contingency intervention system consists of four major components:

1) A playspace within which a variety of responses are possible and from which a variety of consequences can be provided.

2) Input devices for translating a child's movements into simple switch closures.

3) Output devices for providing a variety of visual, auditory, and tactile consequences.

4) An Apple II microcomputer which provides a logical interface for relating input to output, for recording events and for analyzing data.

Play environment. The play environment which has been used thus far is depicted in Figure 56. The child is seated on the platform in an infant seat, on a foam rubber mat, bean bag chair or other type of postural support. The frame provides a mount for a footpanel, levers, hi fidelity speakers, a rear projection screen, and various mechanical toys. A wide range of children from moderately handicapped Down's Syndrome infants to multiply handicapped deaf/blind infants have experienced contingencies of reinforcement in a playspace as depicted in Figure 56.

Alternate positioning arrangements may be necessary for some orthopedically handicapped infants. We are exploring design changes in the playspace for various populations of children as we work with them.

Input devices. Simple switch closure is required as input to the contingency intervention system. A variety of switches have been used with severely handicapped children by Zuromski (1979) and others to reinforce such diverse behaviors as grasping, head raising, arm movement, kicking, pulling and wrist rotation. Any of these switches would be compatible with the present contingency intervention system.

The input devices include 1) levers which can be pushed or pulled, 2) button boxes, 3) kick panels, 4) a pressure sensitive pad, 5) voice activated switches, and 6) a pressure sensitive transducing nipple. The output devices include 1) audiotapes, 2) projected slides, 3) a variety of battery powered toys, 4) light boxes, 5) flip up sketches, and 6) a vibrating pad.

In addition we have used simple button boxes which enables observers to record the frequency and duration of a variety of behaviors. Up to 256 such

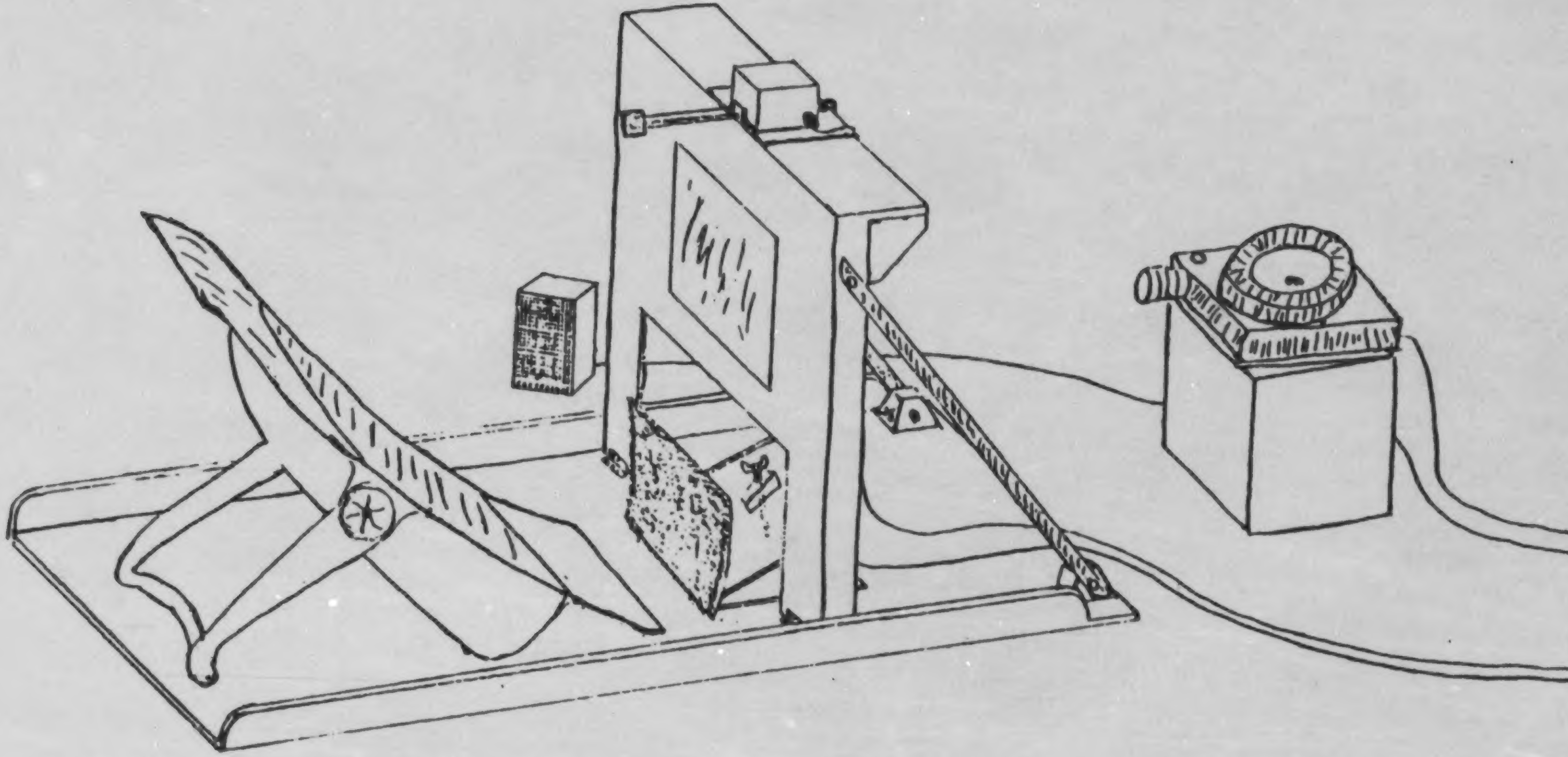

Figure 56. Home contingency apparatus

behavioral codes are possible although we have found it more practical to work with only six such codes at one time. These are smiling, crying, vocalization, attention, primary circular reaction, and distraction. Any one of these observational codes can be linked to a separate contingency of reinforcement.

Two button boxes can be used simultaneously by different observers and the computer can provide analyses for interobserver agreement between them.

Output Devices. Any common electrical device can be used to provide consequences. Modifications have been made on some common battery operated toys (e.g., Mattel's Tuneyville Choo Choo). Devices which we have found to provide useful consequences have been cassette tape recorders, carousel slide projectors, vibrating pads, electrical fans, electric lights, and a locally developed "peek-a-boo". The latter is a drawing of a human face which pops up when the appropriate response is made.

Technology of the Contingency Intervention System

Ten years ago, arranging simple contingencies of reinforcement for certain movements, counting the number of responses and obtaining a graphic display of the results would have required very cumbersome racks of solid state programming equipment and relays. The technology was so cumbersome that it would require moving the infant to the technology rather than moving the technology to the infant. Thus many teachers were forced to abandon automated systems for providing contingencies of reinforcement. Instead the teacher had to determine when a response occurred, provide the reinforcement, and record the data. The result is twofold: first the teacher's attention is of necessity totally utilized in providing the proper contingencies and second contingencies are provided only in a social context. Automation of contingencies frees the teacher to focus on other aspects of the child's behavior during the learning process. For example, the teacher could systematically record the infant's affect, or state of arousal, or attention to the task if she did not at the same time have to decide whether a target behavior had occurred, whether to provide a consequence and what data to record. In addition, experience of some contingencies in non-social contexts may be necessary for infants to discover that consequences are truly under their control.

One breakthrough which the microcomputer has made possible is that the technology can now be taken to the infant in the home or in the classroom. Furthermore, changes in the program of contingencies can be accomplished simply by typing in a simple statement. Finally, a much larger number of behaviors can be monitored and a variety of separate contingencies programmed without extensive additional technology. However, the major advantage of the microcomputer is it's ability to handle large amounts of information quickly. This capacity gives the microcomputer an intelligence which most switching and programming equipment could not match. Moreover, this intelligence is necessary to develop and maintain a generalized expectancy that the environment can be controlled in progressively discrete ways.

The Apple II microcomputer (with 48K) used in the contingency intervention project controls the relationship between movements and consequences, records the frequency and duration of infants' movements and communication to interventionists and presents the results of an infant's learning experiences. The interface developed by the Contingency Intervention Project currently enables the APPLE II to accept up to 8 inputs (or responses) which the infant can produce. These inputs have been arranged so that infant's responses produce a switch closure. For example, movement of the foot against a small panel, movement of the arm to which a ribbon is tied, reaching for a ball placed at midline are all possible inputs which could simultaneously be linked to contingencies of reinforcement. Additionally, 16 inputs can be provided from a coding box operated by an observer/teacher who can press a button which corresponds to a particular behavior emitted by the infant. Any one of these observational codes can also be linked to a particular consequence. Thus contingencies can be provided for very subtle behaviors such as head and eye movements, vocalization of a particular phonetic form, smiling etc.

Up to 8 outputs can be provided, two of which can be linked simultaneously to separate movements by the infant. The type of reinforcement can be switched within a session based upon the infant's behavior. For example, if an infant who has learned to turn on tape recorded music by moving her arms begins to habituate to the music, then her rate of arm movement will begin to decrease. The microcomputer can detect such decreases and based upon a criterion selected for that infant it can switch to a different kind of music or a completely different modality of reinforcement. The microcomputer can be programmed to continually adjust the nature of the contingencies based upon the infant's level of interest. The system fits in a suitcase and has been used primarily in infants' homes.

Microcomputer Programs Available

Two types of computer programs have been developed for the contingency intervention system: 1) control programs; 2) analysis programs. The control programs provide the logic for arranging outputs contingent upon inputs and for recording the data. The analysis programs provide a variety of summaries of a child's learning session. The major analysis programs provide: 1) hard copy printouts of session data; 2) high resolution graphics; and 3) compute the agreement between two observers coding the child's behavior.

Control Programs. Two major programs have been used. The first, the criteria program, arranges contingencies for up to two separate responses and analyzes the rate of up to three separate behaviors. The second control program, the sequence program, provides feedback contingent upon some pattern of behaviors.

The criteria program can control two independent contingencies and arrange for changes in these contingencies when there are changes in the rate of any three behaviors. This program controls contingencies from one simple response-feedback arrangement (e.g., kicking produces music on a schedule of one kick per burst of music) to simultaneous contingencies which change in the course of a session. A criterion can be set which states some change in contingency as a result of a change in the rate of one of three behaviors. Frequency of duration of behavior can be used as the value within these criteria. The rates of behavior can be used as criteria to change a) the type of feedback to the child, b) the schedule of reinforcement, or c) the behavior to be reinforced. Any one of eight contingency changes can be related to a given criterion. Since the program is written in machine language it takes the microcomputer only 1/4 of a second to analyze up to 3 rates of behavior to determine if a criterion has been met and to make the appropriate contingency change. The rate of behavior can be analyzed using from 1s. to 240s as the divisor of the frequency/time equation.

The criteria program has been used 1) to change types of reinforcement when responding fell to the baseline (e.g., satiation); 2) to change schedules of reinforcement when responding had achieved a certain rate; and 3) to decelerate one response while simultaneously accelerating a new response.

To illustrate the possibilities of the criteria program consider a multiply handicapped child for whom the experience of a contingency between his behavior and feedback were an important goal. Suppose it had been determined that the child could move his foot without going into total reflexive extension but generally did not modulate his foot movements to prevent such extension. The criteria program could be used so that an observers coding of extension was the criterion for a change in schedule to no reinforcement. Thus, foot movements would produce reinforcement only if they were not accompanied by extention of other limbs.

The parameters of the criteria program allows one to select two channels (from a total of 64) both of which can be associated with a separate contingency of reinforcement. Different criteria can be associated with each separate contingency of reinforcement.

The criteria analyses can be delayed so the child has some experience with a particular contingency before the contingency is changed. A specific number of responses (up to 240) can be chosen as the criterion value and these can be analyzed across a variable time span (from 1 to 240s.). The change in contingency can be programmed for instances in which the number of responses per unit time either exceeds or falls below the criterion value. Once a criterion is met the new contingency is in operation until a subsequent criterion is met. Since criteria can be linked to one another, program loops of contingency changes can be arranged.

The sequence program allows the user to specify a pattern of up to 8 units consisting of any four responses. For example, reinforcement could be programmed for the sequence: 1) raises head; 2) orients eyes to screen; 3) pulls; and 4) vocalizes which produces a movie with sound track. This program is appropriate for the higher levels of the curriculum in which the child is learning to use his behaviors as tools which can be recombined in different ways to achieve different ends.

Analysis Programs. Four major programs are available for analyzing data generated from the contingency intervention. There programs are:

1) The summary printout program

2) The sequence printout program

3) The high resolution graphics program

4) Interobserver agreement programs

The printout programs interface with a Deckwriter II (Digital Equipment Corporation) via an LSR 256 communication card within the Apple II microcomputer.

The summary printout program provides minute by minute analysis of each channel, each output channel and each observational code. Both frequency and duration measures are provided for four response input channels, four reinforcement output channels and six observational code channels. The frequency and duration of each observational code for each of two observers is provided for sessions in which two observers were present for reliability purposes.

The sequence printout program prints out the time at which each of several responses or consequences ocurred. This enables the user to analyze for temporal and sequential patterns of responding and to determine if the responses or their timing change at various points in the contingency intervention curriculum. This program is especially important to determine whether the infant systematically uses the responses which have functioned as operants in the past to explore new contingencies of reinforcement.

The high resolution graphics program enables the user to produce publication quality graphs from data directly accessed on binary files stored on floppy diskettes. Thus, no key entry of data is necessary as in other comercially available graphics programs such as Appleplot. A standard 16 by 18 unit graph is constructed with a variable ordinate scale option. That is depending upon the child's rate of behavior the ordinate can be scaled with sixteen units with a maximum value of between 8 and 280. Graphs can plot data either in total responses per minute or in cumulative records. The cumulative records add the total responses in a minute to the cumulative total of responses up to that minute. The program summarizes the data loaded from the session file to assist the user in selecting a scale appropriate to the range of behavior within a given session. This summary gives the maximum number of responses per minute for each of the responses analyzed to assist in selection of a scale for non-cumulative minute by minute response frequency graphs. The summary also provides the total number per session of each of the analyzed responses to assist in selecting a scale value for a cumulative record. Up to eight different variables can be analyzed for inclusion in a single graph. These variables can include any combination of measures of child response, observational codes, and reinforcement. Either frequency or duration measures can be selected for these analyses.

A moveable cursor enables the user to put any kind of character (including labels) at any point on the graph. The characters can be created with a separate program and can be permanently stored for use within the high resolution graphics program. One character set which is available contains all the upper case letters of the alphabet as well as some other useful keyboard entries. The moving cursor can also be used to erase any points on the graph or to highlight any points on the graph.

A title can be written on any graph and the graph itself can be permanently stored on floppy diskette. Additional curves can be added at a later date to any permanently stored graph.

The inter-observer agreement program compares the frequency of each observational code for two observers. It also provides the duration of continuous recording of each observational code for each observer. Events are defined in terms of continuous recording of a behavior with no interruption. If an observer stops recording an event for 1/4 second and resumes recording that same code, this is counted as two events. The inter-observer agreement program makes paired comparisions between two observers for every 1/4 second location in the session file. For events the program provides the total number of each observational code for observer A, the total number of each observational code for observer B, and the total number of coincidental occurrences of each code for A and B. For the duration measure the inter-observer agreement program provides the total on-time for each code for observer B, and the total time during which both A and B recorded each code. From these data reliability coefficients such as Cohen's Kappa or percentage agreement can be computed.

The program also allows the user to specify certain criteria for determining events. Thus, the program can eliminate codings of behavioral states (e.g., attention, distraction) which are less than one secord duration. The program can also consider two events separated by less than a 3-second interruption as one event. Thus, some problems of observers being slightly out of phase can be edited from the data if inter-observer reliability criteria do not require paired comparisons of quarter second units.

Accomplishments

Over the five years of the Institute, the software for the Apple II microcomputer necessary for the carrying out of the Contingency Intervention Project was prepared and the contingency devices were designed and linkage to the microcomputer established.

Data storage and retrieval systems were designed and home use of the contingency apparatus and microcomputer was field tested. Documentation of all microcomputer programs was prepared and first generation programs were revised, streamlined, field tested and debugged. To date 22 handicapped infants have received some intervention experience with this equipment. A Contingency Intervention Project brochure was written to provide a description of the system to those interested in using it. The brochure is attached as Appendix D. Finally, a remote field test site was established by sharing the hardware and software of the Contingency Intervention Project with Dr. Cordelia Robinson, Director of the infant program at the University of Nebraska Medical Center's Meyer's Children's Rehabilitation Institute, Omaha, Nebraska.

Competency Assessment Profile

One major product of the Detection Unit of the Institute is the assessment battery developed in the Competency Assessment Project. Development of this battery has evolved through the first 4 years of the Institute. As we used our assessment measures and conducted research with large numbers of normal infants and infants with a variety of handicapping or potentially handicapping conditions, we changed and modified the battery. Tests which did not distinguish between healthy and at risk children or did not give other useful information about the child were dropped. Measures developed in the course of our research program may add useful information about some aspect of the infant's development. Therefore, our assessment battery continues to be evaluated as new measures are designed, tested with normal infants, redesigned for use with handicapped infants, and tested with handicapped infants. All measures were modified for use with children with a variety of physical and mental handicaps. At the end of this process, we have a battery of measures which assess a wide range of skills and competencies and which will be available for use in the field by educators, psychologists and other trained professionals at the end of the Institute.

The Competency Assessment Profile will have a variety of uses in the education of handicapped infants including 1) individual assessment, 2) individual program planning and progress evaluation, 3) group development, and 4) evaluation of intervention programs.

Individual Initial Assessment and Identification

First, the profiles may be used for individual assessment and identification. Traditionally, classification of the handicapped is based on medical and intellectual diagnoses. By observing more than just general intellectual behavior and by discovering whether certain competencies are related to certain handicaps, existing classification techniques could be more accurate. In addition, earlier detection of disability may be possible. For example, language disabilities are usually not discovered until two to three years of age, even though the absence of certain linguistic precursors (e.g., babbling as a social response) may be highly likely to predict a later language disability. We believe that early identification of disabilities can lead to better educational interventions.

Individual assessment may also be defined in behavioral terms. A behavioral classification is valuable in that it 1) may increase parents' and staff members' awareness of their handicapped children's problems, 2) may expand the behavioral options available for intervention, and 3) may identify both the behavioral strengths and weaknesses that may be enhanced or altered. We believe that our profile could greatly expand the use of behavioral classification systems.

Individual Program Planning and Evaluation

Second, the profiles may also be useful in determining what treatment would be most effective for a particular child. The behavioral profiles give an unbiased picture of the child's current level of functioning. For example, consider an infant who has been labeled as motorically impaired and is not progressing as rapidly as had been anticipated. It is concluded that the child has more neurological damage than was previously thought. An examination of the infant's Competency Assessment Profile indicates that the child is seriously lagging in socioemotional development. This suggests that a motivational component might be affecting the developmental lag rather than increased neurological damage, since impaired social relations often lead to decreased exploration and interest in the environment. Therefore, the child's socioemotional competencies might be concentrated upon; for example, the child's relationships with significant others (e.g., the mother) may be examined and altered, ultimately affecting the child's interest in interacting with both his social and cognitive world.

Group Program Development

Third, the profiles, if administered to all children in a given intervention program, may suggest additions, modifications or refocusing of the group program. If, for example, it is found that most of the children in a given program are particularly weak on information processing skills, experiences designed to stimulate development of this skill can take on new importance in the total program.

Evaluation of Intervention Programs

Fourth, the Profile may be used for evaluating as well as developing programs. At the present time, program effectiveness is evaluated by periodic child assessment through a variety of formal and informal means -- case studies, videotaped observations, parent reports, and behavioral checklists, in addition to the Bayley or Gesell Scales. There are two problems with this current approach. First, the effectiveness of a program may be multifaceted in nature. Second, comparison of group means may be misleading, since a program may benefit some but not all of the participants for a variety of reasons.

Assessment Handbook

The other "product" of our detection program will be the educational handbook which will accompany our Assessment Profile Battery. This Handbook will be useful to the assessment personnel who actually administer the battery and also to teachers, program administrators and other professionals who will be using the developmental profiles from the battery in their design and execution of individual and group programs. Included in this Handbook will be background information on the development of the Competency Assessment Profile Battery, explanations of the different applications of the profile (discussed above), instructions for administration of all the measures, and discussions of the meaning of the types of competency profiles which might emerge. An outline of the Handbook follows:

Assessing and Evaluating Handicapped Infants:
The Competency Assessment Project

A. Overview and History of Assessment
    I. Why assess the handicapped infant
    II. How to assess the handicapped infant
        a. Current state of the art, need for better assessment
        b. Problems
        c. Solutions, lead-in to the CAP
    III. The CAP project
        a. History and goals

        - b. Description
        - c. Field testing and test considerations
        - d. Role of programs
- B. Competency Assessment Domains
    - I. Sample characteristics
        - a. Subject characteristics
        - b. Family characteristics
        - c. Program variables
    - II. Linguistic domain
        - a. Brief literature review
        - b. Selection of CAP linguistic measures
        - c. Brief description
        - d. Administration
        - e. Scoring
        - f. Mean data for total, ages, handicapped
    - III. Social and emotional domains
        - a. Brief literature review
        - b. Selection of CAP social and emotional measures
        - c. Brief description
        - d. Administration
        - e. Scoring
        - f. Mean data for total, ages, handicapped
    - IV. Perceptual and cognitive domains
        - a. Brief literature review
        - b. Selection of CAP perceptual and cognitive measures
        - c. Brief description
        - d. Administration
        - e. Scoring
        - f. Mean data for total, ages, handicapped
- C. Interpretation of Assessment
    - I. Linguistic domain
        - a. Feedback formats
        - b. Explanations for staff
        - c. Individual profiles
        - d. Use in curriculum planning
    - II. Social and emotional domains
        - a. Feedback formats
        - b. Explanations for staff
        - c. Individual profiles
        - d. Use in curriculum planning
    - III. Perceptual and cognitive domains
        - a. Feedback formats
        - b. Explanations for staff
        - c. Individual profiles
        - d. Use in curriculum planning
- D. Conclusion
    - I. Interrelations between domains
    - II. Profiles across domains
    - III. Changes over time

Accomplishments

The Competency Assessment Profile has been used on over 120 handicapped children from birth to age 3 1/2. Feedback formats and profiles have been developed, pretested, and redesigned through working with infant stimulation programs in New Jersey. These profiles were presented (both through workshops and written forms) to the programs in which the child was enrolled for 80 of our subjects (for the first 40, when the system was being developed, verbal information on each child was presented in workshops and later on, profile information was given to the programs). In year 5, the Handbook was planned and a number of the chapters have been written.

The Opening Years of Life: Normal, At-Risk, and Handicapped Development

Purpose

The purpose of the project "The Opening Years of Life" is to create a set of media products that can be used by parents of young handicapped infants, by professionals who work with parents of handicapped infants, and by school age children who are likely to interact with handicapped children. Specifically, information about the development and assessment of handicapped and nonhandicapped children based upon recent psychological and educational research is being translated into media materials. The handicapped children portrayed in these media products include children with a known handicap (e.g., Down's syndrome, deaf-blind, cerebral palsey, spina bifida) as well as children who are "at risk" for developmental dysfunction or delay (e.g., infants born prematurely).

Two films (videotapes) and two film strips that illustrate the social and the emotional development of nonhandicapped, handicapped, and at risk children are being produced. These films can be placed in learning resource centers, homes, libraries, and medical clinics for parents to view. They will also be appropriate for distribution to cable networks and public television stations. Among the audiences expected to benefit from these materials are special educators working with handicapped and at risk infants and their families; social workers, nurses, and physical and occupational therapists involved in early intervention with the families; and physicians and other medical personnel responsible for delivery of primary health care services to handicapped and at risk infants and their families.

A third film (videotape) is being made that focuses on the psychological issues related to integrating handicapped children into elementary schools. This film can be used by school systems faced with the task of integrating handicapped children into regular classrooms. The target audience includes children as well as classroom teachers and other school personnel. The film should also be of interest to the general public.

Objectives

The two developmental films have four main objectives: 1) to convey basic knowledge about social and emotional development over the first three years of life; 2) to provide information about assessment techinques used for observing children's development; 3) to illustrate ways in which the development of handicapped and at risk infants is similiar to or diverges from normal developmental patterns; and 4) to illustrate the wide range of differences in the development of all infants.

Each of the developmental films begins with a description of either social or emotional development in the first days of an infant's life. Infants and their mothers are seen in a hospital room and in the intensive care unit of a metropolitan hospital. The course of development is then described for children through three years of age. The underlying themes are that handicapped infants follow a similar though delayed developmental path when compared to normal infants; that although at risk infants are also delayed in many areas they "catch up" with normals in some but not all areas; and that handicapped infants show a great deal of diversity in their development.

The films consider when these differences develop, what factors may influence development (including the child's temperament, handicapping condition, and the social environment provided by the parents), and what the changes in behavior are that occur across the first years of life. In order to examine these questions, the topics under consideration are described by using illustrations of the important developmental tasks of each area of development.

The integration film has as its major objective the exploration of the perceptions, attitudes, and behavioral responses of nonhandicapped school age children toward their handicapped peers. This film, cast in a documentary format, focuses on some of the common beliefs (stereotypes) that children have about the handicapped, sources of prejudice, and how prejudices and stereotypes can be changed by learning more about handicapped people and by interacting with them.

Accomplishments

Preliminary scripts have been written for the two developmental films, and 28 hours of broadcast quality (one inch) videotape were shot over the course of approximately 10 days. Over 60 infants (handicapped and non-handicapped) and their mothers, as well as a few fathers and siblings, participated in the filming of a variety of scenes. The scenes portray developmental changes in children's responses to mothers, fathers, peers, siblings, and strangers, to separation from and reunion with the mother, to mirrors and self-recognition tasks, to wigs and other novel objects, and to several cognitive tasks.

Currently, this footage is being edited into two approximately 20-minute films that will be available for distribution in the form of 3/4-inch videocassettes and film strips. These media products will be disseminated to parents, professionals, and information centers. The target audiences include regional and national parent groups (e.g., the Association of Retarded Citizens, United Cerebral Palsy), regional prenatal networks, national professional conferences (e.g., Council on Exceptional Children, National Developmental Disabilities Council), and information clearing houses (e.g., TADS, WESTAR, ERIC).

Approximately four filming days have been allotted for shooting the integration films. A preliminary script has been drafted and plans are currently underway for establishing a school site. Filming is expected to take place within the next several months.

Developmental Knowledge and Management Practices Scale

Rationale

The professional with one of the best opportunities for early discovery of developmental anomaly in children is the pediatrician or other primary care physician (Jacobs & Walker, 1978; Masland, 1969; Pearson, 1968, 1976). This professional, through assessment of developmental status and parent-child interaction in the routine examination can gain early insight into whether a child is developing normally. Early discovery of a developmental problem by the physician can lead to the implementation of special programs for parents and child that may serve to minimize the effects of developmental disability.

At present, however, physicians are not referring infants and young children exhibiting evidence of developmental disorder as early in the child's life as possible (Gofman, 1969; Masland, 1969). Tardiness on the part of the physician to refer may result in the delayed provision of needed intervention services, the persistence of unrealistic expectations by parents for the child's development, and the emergence of difficulties secondary to the primary developmental problem.

Consequently, we developed a scale that would serve to specify training needs of physicians vis-a-vis their ability to successfully identify and manage developmentally atypical infants and young children. It is anticipated that the scale will be helpful in evaluating the success of educational programs designed to increase physicians' skill and knowledge in assessment and management of handicapped infants.

The scale was designed to assess a) physicians' knowledge of normal child development, and b) their management actions with regards to children exhibiting behaviors indicative of developmental anomaly. The instrument is targeted for use with medical students, residents in pediatrics and family practice, practicing pediatricians, family practitioners, and general practitioners. Use of the scale with physicians other than the pediatrician is anticipated because both family and general practitioners are involved in the provision of primary care to substantial portions of the nation's children (Rosenbloom & Ongley, 1974; Task Force on Pediatric Education, 1978).

Method

For the purposes stated above, an item format was chosen that displays a particular behavior or set of behaviors representative of the actions of a hypothetical child of a given age. The physician is asked to read the description of behavior and then characterize the behavior as developmentally advanced, normal, suspect, or delayed for a child of that age. Next, the physician is asked to choose a course of action with regard to the management of the child. These choices range from a routine followup option, through additional tests necessary, and continued observation, to referral to a specialist. If the physician chooses the referral to a specialist option, indication of the particular specialist to whom referral is being made is requested. This item format was chosen over more conventional formats because of its ability to provide, within the context of a single item, information on knowledge and the ability to apply that knowledge. A sample item is presented in Table 37.

Table 37

Sample Item for Developmental Knowledge and Management Practices Scale: Full Format

A six month old male infant is generally irritable and does not quiet himself with sucking, or to mother's holding, voice or face.

A. I would characterize this child's behavior as . . .

_____1. Advanced (i.e., developmental level greater than 9 mos.)
_____2. Normal (i.e., developmental level between 4, 5 and 9 mos.)
_____3. Suspect: Possible delay or pathology (e.g., developmental level between 3 and 4.5 months)
_____4. Delayed or Pathological (e.g., developmental level less than 3 months)

B. Based on the information presented I feel that . . .

_____1. only routine follow-up is necessary
_____2. additional tests are needed (Please specify): ____________________
____
_____3. continued observation is required; problem will probably resolve itself
_____4. continued observation is required before problem can be diagnosed
_____5. immediate referral for further evaluation is warranted to . . .

    _____1. otolaryngologist
    _____2. pediatric neurologist
    _____3. opthalmologist
    _____4. child psychiatrist
    _____5. pediatric or developmental psychologist
    _____6. clinical child psychologist
    _____7. special educator
    _____8. speech and language pathologist
    _____9. audiologist
    ____10. physical therapist
    ____11. occupational therapist
    ____12. social worker
    ____13. infant stimulation program
    ____14. other (Please specify): ____________________

The scale was designed to cover eight areas of development across four levels of subject status. The areas of development included the affective, temperament, social, cognitive, language, sensory, gross motor, and fine motor domains. Levels of subject status were advanced, normal, suspect, and delayed or pathological. These status levels were defined as follows:

(1) Advanced — any behavior or set of behaviors normally expected to appear at more than 1.5 times the chronological age of the described child. The behavior of a 6-month-old that is not normally seen until the ninth month would be considered to be advanced by this criterion.

(2) Normal -- any behavior or set of behaviors normally expected to appear at .75 to 1.5 times the chronological age of the described child.

(3) Suspect -- any behavior or set of behaviors normally expected to appear at .5 to .75 times the chronological age of the described child. Also included in this category is any behavior or set of behaviors that are suspect for pathology.

(4) Delayed -- any behavior or set of behaviors normally expected to appear at less than .5 times the chronological age of the described child. Also included in this category are behaviors that are pathological in nature, rather than developmental.

The sources for the behaviors that compose the items and the ages at which the behaviors normally appear are the Denver Developmental Screening Test (Frankenburg & Dodds, 1969), the Gesell Developmental Schedules (Gesell & Amatruda, 1947), the First Year of Life series (1971), and Child Development and Personality (Mussen, Conger, & Kagen, 1974).

Table 38 shows the number of items written for each area-by-status cell. After initial formulation, these items were subjected to a number of refining procedures. Items were reviewed by experts in pediatric medicine and developmental psychology who provided suggestions for modifications in the scale. In addition to expert review, a group of 32 items has undergone pilot testing. The results of this testing are presented in Table 39. Of particular interest are the point biserial correlations between individual items and total test score. These correlations indicate the extent to which those who answer a particular item correctly are also those who score highly on the test as a whole. As can be seen from inspection of the table, the correlations between individual items and total score are generally positive. This suggests that most items successfully discriminate among examinees on the basis of knowledge of development. More extensive testing of items with larger samples will be needed, however, before a definitive judgment can be made as to the effectiveness of individual items.

Table 38

Numbers of Items for Each Area of Development and Status Level

Area of Development	Status Level Advanced	Normal	Suspect	Delayed	Row Totals
Affective	2	3	2	3	10
Temperament	2	3	2	3	10
Social	3	3	3	3	12
Cognitive	3	3	3	3	12
Language	3	3	3	3	12
Sensory	1	3	3	3	10
Gross Motor	3	4	3	5	15
Fine Motor	3	3	3	4	13
Column Totals	20	25	22	27	94

Table 39

Preliminary Item Statistics from Pilot Testing of 32 Developmental Knowledge Items (n= 11)

Item #	Developmental Area	Answer	Point Biserial Correlation	Difficulty
29	Affect	Normal	-21	60
23	Social	Normal	-18	90
10	Temperament	Normal	-16	91
13	Cognitive	Suspect	-02	27
19	Sensory	Suspect	01	36
30	Fine Motor	Advanced	04	27
7	Motor	Normal	07	82
1	Language	Suspect	10	50
6	Language	Delayed	11	46
24	Fine Motor	Delayed	16	73
16	Cognitive	Delayed	16	09
18	Affect	Suspect	19	20
26	Sensory	Normal	21	80
12	Cognitive	Advanced	26	55
14	Motor	Suspect	27	20
15	Language	Normal	30	64
32	Fine Motor	Normal	32	55
8	Temperament	Suspect	38	27
22	Affect	Delayed	40	18
31	Social	Suspect	44	56
17	Sensory	Normal	47	60
9	Motor	Advanced	47	91
27	Fine Motor	Suspect	56	30
20	Social	Delayed	59	46
4	Language	Advanced	59	46
28	Affect	Advanced	59	20
11	Motor	Delayed	62	82
2	Temperament	Delayed	72	27
25	Sensory	Advanced	--	00
21	Social	Advanced	--	00
5	Cognitive	Normal	--	1.00
3	Temperament	Advanced	--	1.00

Note: Items arranged according to point biserial correlation of examinee item score with total score of examinee. Decimal points have been removed from correlations and item difficulty indices.

Implications

This scale will be useful for determining the child care physician's knowledge of development and ability to appropriately manage young children exhibiting behaviors of a deviant or suspect nature. As such, the scale may be useful for evaluating the success of medical education programs, and determining specific training needs of physicians engaged in the provision of primary care to children.

Neurodevelopmental Scale

The neuro-developmental examination in Appendix A, Section 2, has been developed specifically for the Identification project. Infant responses to a number of environmental stimuli and reaction to a number of reflex responses across different infant state periods are examined using the scale. This examination was developed by the Detection Unit to include both important CNS reflexology and crucial notions about early infant development. The exam combines items from the Graham et al. (1957) examination, Gesell Motor Assessment (1962), and the Prechtl examination (1976). The exam has been developed for administration across the first three years of life. Use of the exam results in infants being classified as normal/suspect/abnormal.

Children's Emotions and Moods: Theory and Measurement

No one would deny the proposition that in order to understand human behavior and development one must understand "feelings". The interest in emotions is enduring. Yet, within the discipline of psychology the study of feelings and emotions has been somewhat less than respectable, a stepchild to the new fields of cognitive science and psycholinguistics. Without question, issues related to emotion, its development, and its measurement have been neglected in the research literature until quite recently.

From a developmental perspective, Piaget and his followers have articulated a complex theory of transition and change in intellectual behavior. Nearly a century ago Freud proposed an elaborate theory of personality development in which some aspects of emotional growth were considered. Psychologists and educators alike await the construction of a comprehensive theory of emotional development. Recognizing such a need, a research project was undertaken to solve what seemed to be a relatively simple problem: By observing young children could one successfully assess children in terms of individual differences on emotional dimensions such as happiness, fear or anger?

The task appeared easy. Graduate students are generally able to rank children in preschool programs in terms of differences in various emotional dimensions. The students achieve high observer reliability and their rankings of the children seem to have face validity. This outcome suggested that it might be feasible to assess children on dimensions other than cognitive differences. No longer would investigators have to be limited to evaluating children, teachers, or programs solely in terms of intellectual variables.

The construction of a formal assessment instrument that could be used in a systematic way to measure individual differences in children on emotional dimensions was at first slow, in part because there was no theory of emotional development to point the way. It became obvious that the task involved more than measuring children's behaviors that reflect emotional differences. A theoretical structure was needed on which to hang the observations and to provide insight about how particular behaviors fit into the larger scheme.

In 1978 the idea of viewing emotion in terms of a structural analysis was proposed (Lewis & Rosenblum, 1978). This analysis divided emotion into components and permitted the study of each component individually. Until this time the study of emotional development was largely restricted to the study of a single component. Some investigators studied the development of emotional expressions (e.g., smiling), some studied the development of emotional states (e.g., physiological changes), and others studied the development of emotional experiences (e.g., the subjective feelings of emotion). These different approaches to the study of emotion can best be organized into a coherent frame of reference through a structural analysis of emotion. The research proceeded more rapidly as the ways in which simple observations of children's behaviors might fit into the larger scheme of emotional development were identified.

The end result of the research project was a book that outlines a theory of emotional development and describes the construction of an assessment instrument for measuring children's emotions. Two major themes are reflected in the book. The first, a theoretical account of emotion and emotional development, is the focus of chapters 1 through 7. The second, the measurement of individual differences, is the focus of chapters 8 through 12.

The book might be viewed as one step toward the articulation of a comprehensive theory of emotional development. Before this can happen, several factors are necessary. First, psychologists must reify emotional development much as they have cognitive development. This must occur despite the errors involved in reification. The hope is that through reification the study of emotional development may be legitimized.

Second, emotion must be recognized to be a complex phenomenon that requires a structural analysis. By reducing emotion to components of a manageable size and scope psychologists can begin to understand emotion and to articulate models of its development. It would be foolish to regard cognitive development as a single entity. Thus, the study of cognitive development is reduced to the study of its components, including memory, perception, and language. The same approach needs to be taken in studying emotional development.

Third, measurement systems must be devised in order that the study of emotion proceeds from a sound empirical basis. This is not to imply that empirical tools alone are sufficient for understanding emotion. Emotions are, after all, private acts. As such, active participation by the subject is necessary for understanding the phenomenon.

It has been in the measurement of emotion that the most serious advances in the study of emotion have been made. Most investigators, however, have focused on the measurement of a single component, emotional expression, and on specific features, primarily the face. Facial measurement systems are highly sophisticated and require hours of precise analysis of changes in the facial musculature. The need for a broader measurement system, one that will permit the study of emotion under more naturalistic conditions, is necessary. Moreover, such a measurement system should advance the study of individual differences in emotion, a topic of great importance. All three issues are the focus of the book, Children's Emotions and Moods, which is currently in press at Plenum Publishers.

VIII. DISSEMINATION

DISSEMINATION

During the past five years, the Institute has actively engaged in dissemination of both information and products. These dissemination activities are essential for several reasons. First, they increase the amount of knowledge held by persons regarding the handicapped. Second, they make maximum use of the Institute staff's areas of expertise in promoting the health and education of the handicapped. Third, they demonstrate to persons how increased knowledge of the development of handicapped children results in improved services to the handicapped.

Our dissemination activities were geared toward several audiences including:

1) the academic and research community;

2) persons and programs that provide services to handicapped or at-risk children;

3) parents and advocacy groups;

4) state level agencies;

5) local level agencies;

6) national and regional organizations.

Dissemination took many forms, depending upon the audience. Some means of dissemination which have been used are: publication of articles and books, lectures at professional meetings, grand rounds to inform medical personnel, presentations to parent groups, provisions of consultation services, workshop and training sessions, and technical assistance to service providers. In addition, we sought media coverage, including television, newspaper and magazine, in order to reach a wider audience. This endeavor should result in education not only of persons who work directly with the handicapped, but of the general public as well. By providing more information to the general public regarding the Institute's activities and the development of handicapped children we expected to increase the degree of understanding of the handicapped and the need to support continued research activities.

In addition, we disseminated information to various funding agencies. In this way we increased the visibility of the Institute and emphasized the need for the research done and services provided.

Much of our dissemination effort is reflected in our publications and presentations addressed to research scientists. These articles and presentations are catalogued in Chapter VII: PRODUCTS of this report. The following sections document our attempts to disseminate knowledge to the general public, to pediatric staff, to special educators, to families with handicapped children and to state and local agencies. In Table 40 we present a summary of the different kinds of dissemination activities the Institute staff has engaged in and an extimate of the number of people reached through these efforts.

Table 40

Summary of Dissemination Activities by the Institute

Audience	Type of Dissemination Activity	Number	Estimate of Audience Reached
Research Scientists in Psychology, Education and Medicine	Books	11	27,500*
	Chapters	59	147,500*
	Articles	40	120,000*
	Presentations	98	4,900
Medical and Educational Practitioners	Grand Rounds	25	1,250
	Workshops	27	2,150
General Public	Newspaper Reports	40	15,564,000
	Magazine Articles	11	13,266,000
	Television Shows	7	10,000,000
	Radio Shows	5	1,000,000

* These figures are based on sales and circulation figures. However, many purchasers and subscribers are university libraries and the actual audience researched is much greater.

A. MEDIA REPORTS TO THE GENERAL PUBLIC

1. February 22, 1977 - Kansas City Star - "Infant Intelligence Tests May Need Some Revising".

2. February 22, 1977 - Omaha World-Herald - "Intelligence of Infants Measured with Tests".

3. February 22, 1977 - The Light (San Antonio, Texas) - "Inside Infant's Mind".

4. February 22, 1977 - St. Louis Globe-Democrat (St. Louis, MO) - "Infant Intelligence Level is Difficult to Measure".

5. March, 1977 - Human Behavior (Los Angeles, CA) - "Number One Baby".

6. May 2, 1977 - The Evansville Press - "Marriage Takes 'Back Seat' to Children".

7. May 3, 1977 - The Oregonian (Portland, Oregon) - "Raising Children can Lower Satisfaction in Marriage, Study Concludes".

8. May 4, 1977 - The Evening Bulletin - "What do Children do to Parents?"

9. May 4, 1977 - The Tulsa Tribune - "Children can Bring Strain, Happiness to a Marriage".

10. May 5, 1977 - The Arizona Republic - "Childrearing - What it can do to Your Marriage".

11. May 6, 1977 - The San Diego Union - "Ask not What You Do to Children".

12. May 8, 1977 - Herald Examiner (Los Angeles, CA) - "How Children Affect Marriage".

13. May 8, 1977 - The Indianapolis Star - "Bundles of Joy Often Cause Marriage Woes".

14. May 8, 1977 - The Sunday Bulletin (Philadelphia, PA) - "Kids can put Asunder What no Man Can".

15. May 9, 1977 - The Nashville Tennessean - "Children can Damage Parents' Lives, Too".

16. May 9, 1977 - San Francisco Chronical - "What Children can do to Marriage".

17. May 10, 1977 - Chicago Tribune - "Are Children the Answer to a Problem Marriage?".

18. May 13, 1977 - The Milwaukee Journal - "Kids can be Rough on Parents".

19. May, 1977 - New Age (Brookline, MA) - "Babies prefer Kids to Adults".

20. July, 1977 - Good Housekeeping - "Your Baby's Smarter than You Think".

21. December 5, 1977 - Des Moines Tribune (Des Moines, Iowa) - "Exercise for Infants".

22. December 6, 1977 - Democrat and Chronicle (Rochester, N.Y.) - "Should Infants Exercise?".

23. December 7, 1977 - The Courier-Journal (Louisville, KY) - "Experts Differ on Value of Exercise for Babies".

24. December 9, 1977 - The Indianapolis News - "Experts Question Infant Calisthenics".

25. January 29, 1978 - The New York Times - "New Hope for Parents of Handicapped".

26. February 18, 1978 - Chicago Daily News - "Are Babies too Young to Exercise?".

27. March, 1978 - Childhood Education - "Child Care and Public Policy: A Case Study".

28. May 30, 1978 - St. Louis Globe-Democrat - "Social Skills Called Vital for Children".

29. November, 1978 - Contemporary Psychology (Washington, D.C.) - "Some Talk About Conversation".

30. November, 1978 - Psychology Today described the research of Drs. Jane Leifer and Michael Lewis in an article, "The Value of Mothers' Questions".

31. June 17, 1979 - The New York Times Magazine - "A New Look at Life with Father".

32. January 31, 1980 - The staff of Newsweek magazine visited the Institute, interviewed the director, Michael Lewis, and observed the research for an article on infancy. This article, published in February, 1980, reached a national audience.

33. February 1, 1980 - The staff of the American Broadcasting Corporation's news program "20/20" filmed in the lab for a program concerning infant development.

34. June 13, 1980 - Dr. Michael Lewis gave a radio interview on exceptional infants, WCAU, Philadelphia, Pa.

35. August 9, 1980 - The Birmingham News (Birmingham, Alabama) - "The Child is the Father of the Man".

36. August, 1980 - American Baby (New York) - "Frankly for Fathers".

37. September, 1980 - Eyewitness News interviewed the director of the infant lab, Dr. Michael Lewis, and filmed ongoing research for a program on early development. Dr. Lewis was also interviewed by Dr. Joyce Brothers.

38. September, 1980 - Mothers' Manual - "Your Baby's Well-Being: A Lifetime Investment".

39. October 28, 1980 - The New York Times - "Siblings: Studies Find Rivalry, Dependency Revive in Adulthood".

40. November, 1980 - Contemporary Psychology - "From Memory to Attention: A Developing Zeitgeist".

41. November 2, 1980 - Chicago Tribune (Chicago, Ill) - "Sibling Rivalries and Ties Continue Lifelong, Studies Find".

42. November 3, 1980 - Courier-Post (Camden, N.J.) - "New SAT Versions Planned to Aid Handicapped".

43. November 3, 1980 - The Home News (New Brunswick, N.J.) - "Educational Testing Service Hopes to Find Means of Identifying Handicapped Children".

44. November 13, 1980 - The Cincinnati Post - "Psychologist Sees Babies as People, Too".

45. December 4, 1980 - The Sun (Baltimore, MD) - "Sibling Bonds, Rivalries to Last a Lifetime".

46. December 7, 1980 - The San Francisco Examiner published an article by Dora Sobel titled "Siblings: The Unending Bond", following an interview with Dr. Michael Lewis.

47. December 15, 1980 - The New York Times - "Friendship: A Fact of Life for Toddlers, Too".

48. December 15, 1980 - The New York Times published an article titled, "Friendship: A Fact of Life for Toddlers, Too" based on an interview with Dr. Michael Lewis. (Author - Glenn Collins).

49. December 17, 1980 - Courier Express (Buffalo, N.Y.) - "Studies Find Children Form Rich Friendships".

50. December 28, 1980 - Milwaukee Journal - "Sibling Rivalry May Continue Into Adulthood".

51. January 12, 1981 - Newsweek published an article titled, "The Wisdom of Babies" in which Dr. Michael Lewis was quoted as emphasizing the abilities of infants.

52. January 13, 1981 - The Arizona Republic published an article titled, "Researchers Discovering New Insights into the World of Children", citing Dr. Michael Lewis. (Author - Glenn Collins).

53. February 5, 1981 - Dr. Michael Lewis gave a live radio presentation for WRC Radio. The topic was "Exceptional Infants".

54. February 6, 1981 - Charlie Rose Show, Washington, D. C. Dr. Michael Lewis was interviewed regarding child development and the Institute. The topic was "Social Development in Infancy".

55. February 13, 1981 - New Jersey Nightly News interviewed Dr. Michael Lewis and filmed portions of our research for their news broadcast on March 7, 1981.

56. March 2, and 9, 1981 - RAI Corporation, Italian National Television. Dr. Michael Lewis was interviewed for a program in their series on the Psychology of Early Development. Ongoing research was filmed.

57. March 16, 1981 - The New York Times published an article titled, "The Childhood 'Industry': Conflicting Advice". Dr, Michael Lewis, among others, was interviewed for this article. Author - Glenn Collins).

58. August 21, 1981 - An interview with Michael Lewis and Richard Brinker about the Contingency Intervention Project was broadcast by ABC, CBS, and NBC evening news in the New York metropolitan area. This interview was filmed at the Northeast Regional Semifinals of the National Talent Search for Programming Microcomputers for the Handicapped sponsored by John Hopkins University and Tandy Corp.

59. September 17, 1981 - Interview - "Some American Families at Dinner" - The Washington Post.

60. September 21, 1981 - Interview - "Toys" - Vermont Public Radio.

61. September 29, 1981 - Interview: The Panorama Show "Some American Families at Dinner", Washington, DC.

62. October 1, 1981 - Invited Speaker: "Early Social Development". Bradley Forum 1981, Providence, Rhode Island.

63. October 27, 1981 - "Birth Order" - The Charley Rose Show, Washington, DC.

64. February 8, 1982 - Sunrise Semester: "Mother-Infant Interaction". WNBC Television, New York, New York.

65. "Focus on Exceptional Children". A bulletin published and disseminated by Educational Testing Service.

B. GRAND ROUNDS

The Institute staff has, and will continue, to disseminate our research findings to the medical community. One of the major avenues open in pursuit of this goal is participation in Grand Rounds and "in-service seminars" at area hospitals. Following is a listing of our activities in this area.

Fox, N. Attachment: The beginning of social development. Paper presented at Grand Rounds, Department of Child Psychiatry, St. Luke's Hospital, New York, March 1978.

Fox, N. Neurobehavioral development of the preterm infant. Paper presented to the Pediatric Service, Roosevelt Hospital, October 1979.

Fox N. The development of the parent-child relationship in the first year of life. Paper presented to the Child Psychiatry Service, St. Luke's Hospital, February 1980.

Fox, N. Socio-affective development of the high risk infant. Paper presented to Joint Rounds of the Departments of Psychiatry and Pediatrics, Montefiore Hospital, January 1981.

Fox, N. Developmental issues in the socio-affective behavior of preterm infants. Paper presented to the Department of Psychiatry, St. Luke's Hospital, May 1981.

Fox, N. Attention and autonomic balance in the preterm infant. Paper presented to the Pediatric Service, St. Luke's-Roosevelt Hospital, June 1981.

Lewis, M. Developmental Models and Assessment Issues , Albert Einstein College of Medicine, Bronx, New York, November 16, 1981.

Lewis, M. The development of handicapped infants. Grand Rounds. Rutgers University Medical Center, New Brunswick, N.J., February 17, 1981.

Lewis, M. The physician's role in diagnosis and management of mental retardation. Lecture at the College of Medicine, Northeastern Ohio Universities, Rootstown, Ohio, February 12, 1981.

Lewis, M. Social and emotional development. Grand Rounds, Rutgers University Medical Center, New Brunswick, N.J., February 10, 1981.

Lewis, M. Infants' mental development in the opening years of life. Grand Rounds, Rutgers University Medical Center, New Brunswick, N.J., February 3, 1981.

Lewis, M. Developmental principles and their implications for health, assessment and intervention. Grand Rounds, Rutgers University Medical Center, New Brunswick, N.J., January 27, 1981.

Lewis, M. The socialization of affect. Grand Rounds, University of Miami Medical Center, Miami, Florida, December 18, 1980.

Lewis, M. Developmental models in the early detection of developmental dysfunctions. Grand Rounds, College of Medicine and Dentistry of New Jersey - Rutgers Medical School, New Brunswick, N.J., March 25, 1980.

Lewis, M. The social development of the young child. Invited lecture, Department of Psychiatry, College of Medicine and Dentistry of New Jersey, Rutgers Medical School, Piscataway, N.J., March 24, 1980.

Lewis, M. Social cognition and the acquisition of self. Grand Rounds, Department of Psychiatry. Downstate Medical Center of the City University of New York, N.Y., December 12, 1979.

Lewis, M. Early social development: The child and its family. Child Psychiatry Grand Rounds, College of Physicians and Surgeons of Columbia University, N.Y., September 19, 1979.

Lewis, M. Developmental principles in intervention. Grand Rounds, Hahnemann Medical College and Hospital, Community Mental Health/Mental Retardation Center, Philadelphia, Pa., April 6, 1978.

Lewis, M. The young child's social world. Grand Rounds, Psychiatric Service, St. Luke's Hospital, New York, N.Y., March 29, 1978.

Lewis, M. The child's social network. Grand Rounds, St. Luke's Hospital, New York, N.Y., October 4, 1977.

Lewis, M. Infant development. Grand Rounds, Columbia University Babies Hospital, New York, N.Y., April 29, 1977.

Lewis, M. The mother-infant attachment system and the child's social world. Invited lecture, Booth Maternity Hospital, Philadelphia, Pa., November, 10, 1976.

Lewis, M. Cognitive development in the first two years of life. Grand Rounds, Roosevelt Hospital, New York, N.Y., July 23, 1976.

Lewis, M. Early cognitive development. Grand Rounds, Harlem Hospital, New York, N.Y., March 4, 1976.

Lewis, M. Infant intellectual development. Grand Rounds, Babies Hospital, Columbia Presbyterian Medical Center, New York, N.Y., January 9, 1976.

C. WORKSHOPS

In order to reach those persons who provide direct services to handicapped children and their families, several workshops, both regional and national, have been held. These include:

a. Skill Development in the Handicapped Infant. In this a two-day conference held at Educational Testing Service in 1978 an overview of assessment strategies and workshops on assessment techniques, on program planning, and on profile development were given to 150 special education and early childhood education personnel from the Mid-Atlantic Region.

b. A workshop was presented at the TASH meeting in Baltimore in 1978 on the development of the CAP profiles.

c. The use of mother-infant observational techniques for assessment and curricula planning was presented at the HCEEP meeting, Washington, 1979. In this workshop, various observational techniques were discussed and our technique demonstrated.

d. Theory on, data from, and practical application of our attention measure was presented at a half-day workshop on the Annual Symposium of the New Jersey Association of Learning Disability Consultants in Woodbridge, N.J., 1980.

e. Infant intelligence tests and their uses and misuses for handicapped young was presented at a workshop sponsored by the New Jersey Symposium in New Brunswick, N.J., 1979.

f. At the HCEEP meetings to be held in Washington, 1980, we will demonstrate the use of the CAP Profiles in a workshop. Additionally, a workshop on the usefulness of the attention task will be held.

g. A workshop at the Conference on Developmental Disabilities in the Preschool Child, Hightstown, New Jersey, 1979, a demonstration of social and emotional measures of early development were presented.

h. In a workshop at the Council for Exceptional Children meetings, Houston, 1979, the issue of who, how, and when to assess was discussed, with suggestions demonstrated from the CAP.

i. In the seminars in the Special Education Series sponsored by Educational Testing Service, 1980 for Mid-Atlantic Region Special Educators, data from the cognitive and self recognitory measures, and uses of this data in intervention were presented in one workshop and an overview of CAP and assessment issues in another.

j. Four workshops were held at the Roosevelt-St. Luke's Medical Center, specifically for the Preschool for the Multiply Handicapped and the Developmental Disabilities Center on all aspects of CAP in 1980.

k. Two workshops were held, one in 1978 and one in 1979 for the New Jersey Coalition of Infant Stimulation Program Administrators on the development and progress of CAP.

l. Workshops were also held at all infant stimulation programs in which we have worked, including Project Child; Hunterdon Medical School; Early Intervention Program of Lakewood, New Jersey; Early Intervention Program of Wickatunk, New Jersey; Down's Syndrome Foundation, Staten Island; UCP, Edison, New Jersey; Retarded Infant Services, New York City; Developmental Daycare Center, Trenton, New Jersey; Preschool for the Multiply Handicapped, New York City, and UCP, New York City.

m. Workshop on assessing visual impairment at the Conference on Developmental Disabilities in the Preschool Child, Chicago, 1979.

n. "The importance of early learning experiences for your children". Presentation to the parents of children of the New Jersey Association for Retarded Citizens' Developmental Day Care Center, Trenton, N.J.

o. "Learning to learn in the contingency intervention project". Presentation to the staff of Project Child, Mercer County Special Services Unit.

D. INSTITUTE BROCHURE

The Institute has been actively engaged since its inception in an attempt to disseminate as much information as possible regarding its research activities. Each year a brochure is prepared which is distributed at professional meetings, in response to requests for information and in other situations. This brochure includes a summary of the theoretical principles underlying the activities within the Institute, summaries of ongoing research projects and lists of available articles which provide more detailed information about various projects.

E. STATE AND LOCAL AGENCIES

The Institute has from its inception been involved with New Jersey state and local agencies. In 1978 the Institute in conjunction with Johnson and Johnson Baby Products sponsored a conference to review the availability of infant intervention programs in the state. Representatives from the New Jersey Coalition of Infant Programs, the New Jersey Departments of Health, Human Services and Education were present.

It was clear from this initial conference that there has not been a coordinated effort in the provision of early intervention services. The service providers were not aware of various sources of support which might provide a secure base for the future of their programs. The state agencies often were not aware of resources available through other agencies. The picture which emerged at this first conference "Young Handicapped Children: Policy Directions for New Jersey" was a picture of disjointed and uncoordinated good will.

Over the past year we have obtained the cooperation of Johnson and Johnson Baby Products to extend the dialogue from the first conference. Dr. Lewis, Dr. Brinker, and Dr. Brooks-Gunn have met with various individuals ranging from local program staff to the state director of special education.

Specifically, we have met on an individual basis with administrators from the Departments of Health and Education. In addition, we have met with Dr. Elizabeth Boggs of the New Jersey Association for Retarded Citizens, with the New Jersey Developmental Disability Council, and with Ethan Ellis of the Office of the Public Advocate. Dr. Brinker has been named to the program and long range planning committees of the Coalition of New Jersey Infant Programs. We have also provided a demonstration to the State Department of Education of various Institute activities and have participated in a discussion of New Jersey Special Education priorities presented at the State Department of Special Education.

The emergent view resulting from these discussions is that coordination effort is on many people's minds but no clear plan has been put forward. However, a state bill (A-538) mandating early education has been passed by the state legislature and was signed into law in January 1982. This bill provides services for severely handicapped children from birth to five years of age. Children under three would be served by Human Services and Health while children over three would be served by Education. Education would have general administrative oversight for the full implementation of this bill.

The New Jersey Department of Education was funded by the Office of Education through a state implementation grant to continue on a large scale the fostering of interagency collaboration described above. Specifically, Dr. Patti Hill of the Department of Education brought together professional and community leaders to develop the rules and regulations from the new state law.

An overall advisory committee consisting of the state directors of Human Services, Health, and Education and leading professionals in the state was appointed. Dr. Michael Lewis serves on this committee and has participated actively in their monthly meetings since February 1982.

Dr. Richard Brinker was appointed to the Intervention Task Force and has participated actively in developing the proposed rules and regulations for intervention. Dr. Brinker generated a basic outline of the areas to be included in the proposed regulations and participated actively in a two day writing session in which the task force generated a preliminary draft of the regulations.

Dr. Jeanne Brooks-Gunn was appointed to the Assessment Task Force and participated in their development of standards for child assessment and criteria for program eligibility.

Thus, senior Institute staff have had key roles in the development of state policy regarding infant and preschool services for handicapped children in the state.

Dr. Brinker has developed a close working relationship with Project Child of Mercer County Special Services District. In the past year he has been involved in several discussions with Linda Lamb, Principal of the district's segregated school for severely, multiply and orthopedically handicapped students. These discussions have included input regarding methods by which a greater degree of social integration could be achieved between students in these programs and students in regular education programs. Dr. Brinker also conducted a half day workshop concerning the design of the classroom physical environment and the structuring of social groups to promote interaction and communication. Finally, in conjunction with the Mercer County Special Service District, Dr. Brinker wrote a grant proposal for providing infant intervention services in the homes of Trenton inner-city families with handicapped children which is an inadequately served population. Unfortunately the proposed "Trenton Intervention Project" was not reviewed for the Handicapped Children's Early Education Model Programs because of federal budget cuts which resulted in the return of all submissions under that announcement.

Dissemination of the program level also continues through the Contingency Intervention Project and the Competency Assessment Project. Since the children involved in these projects are also involved in programs of the infant coalition, the individual child is the basis for dialogue with local programs. This dialogue occurs on a regular basis.

IX. TRAINING

A. STUDENTS AND VISITING SCHOLARS

Training of professionals in various areas of expertise including pediatric, special education, developmental psychology and clinical psychology has been and continues to be an important endeavor of the Institute. One of our major goals has been the training of students. During the past four years, approximately 45 students have received training. These students are in the areas of special education, developmental, clinical, and educational psychology, sociolinguistics, and early childhood education. Each student participated in a specific project in research, intervention, or detection as well as in the Institute seminar series and student training programs (see below). Table 41 presents a list of these students, their university affiliation, major area, position at the Institute, Institute project, and current position.

Each pre- and post-doctoral fellow proposed and designed a pilot research project under the supervision of the Institute Director. These projects are described in the Research Unit of this report.

In addition, the facilities of the Institute have been made available to visiting scholars on leave from their universities (see Table 42).

B. PEDIATRIC TRAINING

The need of training in assessment, detection and intervention is critical for pediatricians working with at risk and handicapped infants. The practicing pediatrician is becoming the primary care provider for the child and, frequently, the emotional support for the child's family. The pediatrician must deal with the physical, social, and emotional effects of developmental anomalies resulting from biological causes and environmental conditions. While knowledge related to psychological development vastly expanded over the last decade, pediatric training has not focused on this knowledge. To prepare the pediatrician for his role in detection assessment of child developmnet, this knowledge must be disseminated. The Institute staff, through its involvement at hospitals throughout New York City and New Jersey has been actively involved in disseminating information on normal and atypical development to physicians.

During the previous years the following activities have been undertaken:

a. Pediatric residents rotated through the Infant Laboratory at the Roosevelt Hospital, observing the ongoing assessments of the different age infants.

b. Special seminars and conferences on developmental pediatrics were held for the pediatric staff. There presentations for medical personnel are listed on pages 384 and 385.

Table 41

Institute Training

Trainee	University Affiliation	Interest	ISEC Position	ISEC Project	Current Position
Laurie Waite	University of N.Y. at Buffalo	Educational Psychology	Predoctoral Fellow	Imititation in Down's Syndrome Infants	Director Mental Health Clinic Elmira, Maine
Mark Starr	University of Pennsylvania	Developmental Psychology	Postdoctoral Fellow	Development of Premature Infants	Assistant Professor Dept. of Nursing University of British Colombia
Christian Minor	New York University	Psychology	Predoctoral Fellow	Mother-Infant Interaction in At Risk Populations	Graduate Student
Miriam Levau	Teachers College Columbia University	Special Education	Predoctoral Fellow	Behavioral Pediatrics in At Risk Infants	Graduate Student
Sandy Cortelyou	University of Pennsylvania	Educational Psychology	Predoctoral Fellow	Age Perception	Graduate Student
Nancy Bush	Pennsylvania State University	Special Education	Summer Intern	Mother-Infant Interaction in Intervention Programs	Gratuate Student
Barbara Mayers	Temple University	Developmental Psychology	Summer Intern	Maternal Internal-External Control of Infant Behavior	Graduate Student
Nancy Baldini	University of Rochester	Developmental Psychology	Summer Intern	Attentional Processes in At Risk Populations	Graduate Student
Louise Tubio-cid	Roosevelt Hospital	Behavioral Pediatrics	Research Assistant	Behavioral Neurology in At Risk Population	Medical College of Pennsylvania, Philadelphia
Dulce Urena	Roosevelt Hospital	Behavioral Pediatrics	Social Worker	Social Support Systems in At Risk Infants	Medical Student Mt. Sinai
Lucille Weistuch	Yeshiva University	Special Education	Predoctoral Fellow	Language Intervention With Handicapped Children	Predoctoral Fellow

Table 41(continued)

Institute Training

Trainee	University Affiliation	Interest	ISEC Position	ISEC Project	Current Position
Margaret Thorpe	Rutgers University	Educational Psychology	Research Associate	Mainstreaming Handicapped Children	Research Associate
Margaret Sullivan	Rutgers University	Developmental Psychology	Research Associate	Contingency Intervention with Handicapped Infants	Research Associate
Joyce Gant		Developmental Psychology	Research Assistant	Contingency Intervention with Handicapped Infants	Research Assistant
Mary Enright	Rutgers University	Developmental Psychology	Research Associate	Long-term Development in Handicapped Children	Research Associate
Elizabeth Hartka	University of California	Quantitative Psychology	Research Assistant	Contingent Learning in Infancy	Graduate Student
John Jaskir	Princeton	Quantitative Psychology	Research Associate	Statistician	Research Associate
Lorraine Luciano		Developmental Psychology	Research Assistant	Long-term Development in Handicapped Infants	Research Assistant
James Rosso		Developmental Psychology	Research Assistant	Long-term Development in Handicapped Infants	Research Assistant
Mary Hawryluk		Educational Psychology	Senior Research Assistant	Long-term Development in Handicapped Infants	Graduate Student
Pam Ritter		Educational Psychology	Research Assistant	Long-term Development in Handicapped Infants	Marketing Research
Elizabeth Judd		Psychology	Research Assistant		
Ken Provencher		Educational Psychology	Research Assistant	Teaching Handicapped Children	Assistant Professor, Dept. of Special Education Temple University

Table 41(continued)

Institute Training

Trainee	University Affiliation	Interest	ISEC Position	ISEC Project	Current Position
Barbara Gsovski	New York University	Early Childhood Education	Predoctoral Fellow	Affective Development	Predoctoral Fellow
Lauren Abbe	University of Rochester	Developmental Psychology	Postdoctoral Fellow	Attachment Relationships	Marketing Research
Miriam Kotsonis	University of Virginia	Developmental Psychology	Postdoctoral Fellow	Social Cognition in Handicapped Children	Research Scientist Bell Laboratories
Kathy Gerrity	Temple University	Developmental Psychology	Predoctoral Fellow	Attentional Processes in At Risk Populations	Research Psychologist University of Oklahoma Health Science Center
Candice Feiring	University of Pittsburgh	Developmental Psychology	Postdoctoral Fellow	Family Interaction	Assistant Professor of Pediatrics Rutgers Medical School
Jane Leifer	Princeton University	Linguistics	Postdoctoral Fellow	Language Development	Assistant Professor University of Maryland Department of Special Education
Paula Bell	University of North Carolina	Special Education	Graduate Intern	Intervention With Handicapped Students	University of Maryland Department of Special Education
Aileen Wehren	Rutgers University	Educational Psychology	Senior Research Assistant	Assessment of Handicapped Infants	Coordinator of Handicapped Services, Project Head Start South Bend, Indiana
Agatha Jarvis	City University of New York	Developmental Psychology	Research Assistant	Assessment of At Risk Infants	Graduate Student
Randy Bennett	New York University	Special Education	Predoctoral Fellow	Physicians Knowledge of Development	Director of Special Educatio Educational Testing Service
Phyllis Urman-Klein	Albert Einstein University	Clinical Psychology	Intern	Nuturance in At Risk Populations	Supervisor of Clinical Psychology Training Albert Einstein University

Table 41(continued)

Institute Training

Trainee	University Affiliation	Interest	ISEC Position	ISEC Project	Current Position
Sharon Gerber	University of North Carolina	Developmental Psychology	Research Assistant	Intervention With Handicapped Infants	Graduate Student
Adrianne Gaffuri	Portland State University	Developmental Psychology	Research Assistant	Mother-Infant Interaction	Assistant Professor Department of Psychology, Portland State University
Linda Michalson	New School for Social Research	Developmental Psychology	Postdoctoral Fellow	Socio-emotional Development	Postdoctoral Fellow
Deborah Coates	New York University	Developmental Psychology	Predoctoral Fellow	Mother-Infant Interaction	Assistant Professor Catholic University
Margaret Bendersky	University of Washington, Seattle	Educational Psychology	Predoctoral Fellow	Mother-Infant Interaction in At Risk Populations	Predoctoral Fellow
Carolyn McGuffog	Teachers College Columbia University	Special Education	Predoctoral Fellow	Attachment	Predoctoral Fellow
Joseph Lao	Teachers College Columbia University	Special Education	Research Assistant	At Risk Infants	Research Assistant
Lauren Brandt	New York University	Clinical Psychology	Predoctoral Fellow	Mother-Infant Interaction	Predoctoral Fellow
Marion Stoltz-Loike	New York University	Developmental Psychology	Predoctoral Fellow	Sensory-Integration	Predoctoral Fellow

Table 41 (continued)

Institute Training

Trainee	University Affiliation	Interest	ISEC Position	ISEC Project	Current Position
Sherrill Lord		Psychology	Research Assistant	Infant Learning	Research Assistant
Janet Shapiro	Cornell	Special Education	Research Assistant	Long-term Development in Handicapped Infants	Assistant Program Director Children's Television Network
Annie Harnandez	Teachers College Columbia University	Special Education	Research Assistant	Assessment of Handicapped Infants	Research Assistant
Jaimie Greene	Hofstra University	Clinical Psychology	Predoctoral Fellow	Mother-Infant Interaction	Predoctoral Fellow
Maria Rivera	New School for Social Research	Clinical Psychology	Family Worker	Identification of High-risk Infants	Family Worker

Table 42

Visiting Scholars at the Institute

Visiting Scholar	Affiliation	Research Interest
Jeanette Haviland	Rutgers University	Development of Emotions
Elise Mazur	Northern Illinois University	Language Development
David Mitchell	University of Waikato New Zealand	Parental Interactions with Handicapped Children
Saul Fineman	University of Wyoming	Development of Fear and Attachment
Judy Zarin-Ackerman	New School for Social Research	Children's Rights
Kenneth Thurman	Temple University	Special Education

C. INTERDISCIPLINARY TRAINING SEMINARS - YEAR 5

An important function of the Institute for the Study of Exceptional Children is to provide cross-disciplinary training in the areas of special education and developmental psychology. Toward this end, each year the pre- and post-doctoral fellows have organized a series of seminars which have functioned as a forum for the exchange of information. In past years, topics have included the following areas of research: attentional processes, infant memory, early language development, and the effects of integration on the development of handicapped children.

This year, the seminar series consisted of two parts:

1) formal lectures by guest speakers

2) information seminars conducted by the Institute for the Study of Exceptional Children fellows and staff

Each section of the series will be presented briefly below.

1) Guest Speaker Seminar Series. This series consisted of invited speakers who presented research on developmental phenomena. The series was publicized and was open to members of ETS outside of the Institute. The participants were:

a) Dr. John Watson
University of Southern California
Topic: The Infant's Response to Contingent Events

Dr. Watson presented a theoretical framework for detecting infant learning. Data was presented on infant's learning patterns prior to six months of age.

b) Dr. Leonard Rosenblum
Downstate Medical Center
Topic: The Economics of Mothering

Dr. Rosenblum spoke on the attachment behavior demonstrated by macaque and bonnett-tail monkeys.

c) Dr. Lorraine Nicholich
Rutgers University
Topic: Symbolic Play and Language Acquisition

Dr. Nicholich presented her coding scheme for measuring emerging symbolic play behavior. Data was presented to link emerging play behavior with levels of early language behavior.

d) Dr. June Reinisch
Rutgers University
Topic: The Interaction of Hormones and Environment on Sex Role Development

Dr. Reinisch presented both animal and human data in support of the thesis that both hormones and social factors influence the development of sex-role behavior.

2) Informal Seminar Series. This series consisted of small group (ISEC staff only) discussions. Since the fellows and the staff have varied areas of training and expertise, these informal exchanges have contributed to a truly inter-disciplinary atmosphere, with new and challenging information input for all concerned.

a) The Effects of Training on Language Development and Expectancy - In this session, Lucille Weistuch presented her dissertation data on the maternal language teaching styles utilized by mothers of non-handicapped and Down's Syndrome children matched for MLU 1.0-1.5. The effects of training on these styles as well as the styles prior to training were discussed.

b) Attachment and Socioemotional Adjustment - In this session, Carolyn McGuffog presented her dissertation data on the relationship between early mother-infant attachment (12 months) and later socioemotional adjustment (age 6 years).

c) The Effect of Several Infant Characteristics on Maternal-Infant Interaction at 3 Months - Margaret Bendersky presented her dissertation data on the effects of infant health and maturity at birth and visual attention at 3 months of age on a variety of maternal and infant interaction behaviors.

d) The Development of Gesture Imitation in Infancy - Dr. Elise Masur presented her data documenting the development of gestural imitation in infancy and its correlates to the development of vocal imitation.

D. EVALUATION OF THE FELLOWS AND THE TRAINING PROGRAM

Individual evaluations between the ISEC director and each of the fellows has been an ongoing activity. In addition, there has been continuous, informal feedback from project directors concerning the structure and content of the seminars and guest speakers. At the end of Year 5, the fellows will write a report on their evaluation of the program, its strengths and weaknesses, and suggestions for changes to improve the training program. Feedback from ISEC staff will be actively solicited by the fellows, and staff suggestions will also be included in the final evaluation.

E. ACCOMPLISHMENTS

In Year 5, predoctoral fellows designed, conducted and reported their studies and the Institute and guest speaker seminar series was carried out.

X. REFERENCES

References

Achenbach, T.M. The child behavior profile: I. Boys aged 6-11. *Journal of Consulting and Clinical Psychology*, 1978, *46*(3), 478-488.

Ahrend, R., Grove, F.L., & Sroufe, L.A. Continuity of individual adaption from infancy to kindergarten: A predictive study of ego-resiliency and curiosity in preschoolers. *Child Development*, 1979, *50*, 950-959.

Ainsworth, M.D.S. Object relations, dependency, and attachment: A theoretical review of the infant-mother relationship. *Child Development*, 1969, *40* 969-1025.

Ainsworth, M. The development of infant-mother attachment. In B. Caldwell & H. Ricciutti (Eds.), *Review of child development research, Vol. 3*. Chicago: University of Chicago Press, 1973.

Ainsworth, M.D.S. Social development in the first year of life: Maternal influences on infant-mother attachment. In J.M. Tanner (Ed.), *Developments in Psychiatry Research: Essays Based on the Sir Geoffrey Vickers Lectures of the Mental Health Foundation*. London: Hodder & Stoughton, 1977.

Ainsworth, M.D.S., & Bell, S.M. Attachment, exploration and separation: Illustrated by the behavior of one year olds in a strange situation. *Child Development*, 1970, *41*, 49-68.

Ainsworth, M.D.S., Blehar, M.C., Waters, E., & Wall, S. *Patterns of attachment: A psychological study of the strange situation*. Hillsdale, N.J.: Lawrence Erlbaum Assoc., 1978.

Ainsworth, M.D.S., & Lamb, M. Personal communication, 1979.

Ainsworth, M.D.S., & Wittig, B.A. Attachment and exploratory behavior of one-year-olds in a strange situation. In B.M. Foss (Ed.), *Determinants of infant behavior, Vol. IV*. London: Methuen, 1969.

Almy, M. *Early childhood education at work*. New York: McGraw-Hill, 1975.

Amiel-Tison, C. Neurological evaluation of the maturity of newborn infants. *Archives of the Diseases of Childhood*, 1968, *43*, 89.

Annet, M. The growth of manual performance and speed. *British Journal of Psychology*, 1970, *61*, 545-548.

Apgar, V. A proposal for a new method of evaluation of the newborn infant. *Current Researches in Anesthesia and Analgesia*, 1953, *32*, 260-267.

Apgar, V. The newborn (Apgar) scoring system: Reflections and advice. *Pediatric Clinics of North America*, 1966, *13*, 645-650.

Appell, M.W. Longitudinal study of children with congenital rubella attending school for the deaf. Paper presented at the meeting of the New York State Association of Education of the Deaf, New York, October 1976.

Badian, N. Auditory-visual integration, auditory memory, and reading in retarded and adequate readers. Journal of Learning Disabilities, 1977, 10(2), 108-114.

Barnett, C., Leiderman, P.,Grobstein, R., & Klaus, M. Neonatal separation: The maternal side of interactional deprivation. Pediatrics, 1970, 45, 197.

Barnett, T.E., & Miller, L.R. The organization of non-nutritive sucking in the premature infant. Journal of Experimental Child Psychology, 1973, 16(3), 472-483.

Bates, E. Language and context: The acquisition of pragmatics. New York: Academic Press, 1976.

Bayley, N. Bayley scales of infant development. New York: The Psychological Corporation, 1969.

Bayley, N. Development of mental abilities. In P. H. Mussen (Ed.), Carmichael's manual of child psychology (3rd ed., Vol. 1). New York: Wiley, 1970.

Beckwith, L. Caregiver-infant interaction and the development of the high risk infant. In T. Tjossem (Ed.), Intervention strategies for high-risk infants and young children. Baltimore: University Park Press, 1976.

Bell, R. A. A reinterpretation of the direction of the effects in studies of socialization. Psychological Review, 1968, 75, 81-95.

Bell, P. The development of the concept of object as related to infant-mother attachment. Child Development, 1970, 41, 291-311.

Bell, P. B. Characteristics of handicapped infants: A study of the relationship between child characteristics and stress as reported by mothers. Unpublished doctoral dissertation. Chapel Hill, N.C.: University of North Carolina, 1980.

Berkson, G., Wasserman, G.A., & Behrman, R.E. Heart rate responses to an auditory stimulus in premature infants. Psychophysiology, 1974, 11(2), 244-246.

Bertenthal, B., & Fischer, K. Development of self-recognition in the infant. Developmental Psychology, 1978, 14, 44-50.

Bever, T. The cognitive basis of linguistic structure. In J. Hayes (Ed.), Cognition and the development of language. New York: John Wiley, 1970.

Beveridge, M., & Brinker, R.P. An ecological-developmental approach to communication in retarded children. In M. Jones (Ed.), Language disorders in children. London: MTP Press, 1980.

Bijou, S.W. Theory and research in mental (developmental) retardation. The Psychological Record, 1963, 13, 95-110.

Birch, H.G., & Lefford, A. Intersensory development in children. Monographs of the Society for Research in Child Development, 1963, 28(89).

Birch, H., & Lefford, A. Prediction of intellectual performance at 3 years from infant test and personality measures. Merrill-Palmer Quarterly, 1972, 18(1).

Bjerre, I., & Hansen, E. Psychomotor development and school adjustment of 7 year old children with low birth weight. Acta Paediatrica Scandinavia, 1976, 65, 88-96.

Block, J., & Block, L.H. The role of ego control and ego-resiliency in the organization of behavior. In W. Collins (Ed.), Minnesota Symposium on Child Psychology, Vol. 13. Hillsdale, N.J.: Lawrence Erlbaum, 1980.

Bloom, L. One word at a time: The use of single-word utterances before syntax. The Hague: Mouton, 1973.

Bloom, L. & Lahey, M. Language development and language disorders. New York: Wiley, 1978.

Borke, H. Interpersonal perception of young children: Egocentrism or empathy? Developmental Psychology, 1971, 5, 263-269.

Bower, E.M. Early Identification of Emotionally Handicapped Children in School. Springfield, Ill: Charles C. Thomas, Publisher, 1969.

Bowlby, J. Attachment and Loss: Vol. 1: Attachment. New York: Basic Books Inc., 1969.

Braine, M. The ontogeny of English phrase structure: The first phase. Language, 1963, 39, 1-13.

Brazelton, T.B. Assessment of the infant at risk. In H.J. Osofsky (Ed.), Clinical obstetrics and gynecology: High risk pregnancy with emphasis upon maternal and fetal well being (Vol. 16). Hagerstown, Md.: Harper & Row, 1973.

Brazelton, T.B. Neonatal behavioral assessment scale. Philadelphia: J. B. Lippincott (Spastics International Medical Publications), 1973.

Brazelton, T.B., Koslowski, B., & Main, M. The origins of reciprocity: The early mother-infant interaction. In M. Lewis & L. Rosenblum (Eds.), The effect of the infant on its caregiver: The origins of behavior. Vol. 1. New York: Wiley, 1974.

Brewer, G.D., & Kokalik, J.S. Serving the deaf-blind population: Planning for 1980. Santa Monica, CA.: Rand Corp., 1974.

Bricker, D.D., & Carlson, L. *The relationship of object and prelinguistic social communicative schemes to the acquisition of early linguistic skills in developmentally delayed infants*. Paper presented at the Conference on Handicapped and At-Risk Infants: Research and Application, Asilomar, Calif., April 1980.

Bricker, W.A. Identifying and modifying behavioral deficits. *American Journal of Mental Deficiency*, 1970, *75*, 16-21.

Bricker, W.A. Service of research. In N.G. Haring, R.D. Sherr, & L. Brown (Eds.), *Hey, don't forget about me!* Reston, Va: Council for Exceptional Children, 1976.

Brinker, R.P. Contextual contours and the development of language. In M. Beveridge (Ed.), *Children thinking through language*. London: Edward Arnold, 1982. Pp. 239-264.

Brinker, R.P., & Bricker, D.D. Teaching a first language: Building complex structures from simpler components. In J. Hogg & P. Mittler (Eds.), *Advances in mental handicap research*. London: Wiley, 1980.

Brinker, R.P., & Chatelanat, G. Normative and conceptual developmental models: Distinctions for special education preschool programs. In review, *Journal of Applied Developmental Psychology*.

Brinker, R.P., & Goldbart, J. Developments in research: The language program. In J. Hogg (Ed.), *Anson House preschool project: The first two years*. Hertford, England: Dr. Barnardo's, 1979.

Britton, J.O., & Britton, J.H. Discrimination of age by preschool children, *Journal of Gerontology*, 1969, *24*, 457-460.

Broman, S.H., Richards, P.L., & Kennedy, W.A. *Preschool IQ: Prenatal and early developmental correlates*. New York: Wiley, 1975.

Bronfenbrenner, U. *The ecology of human development*. Cambridge, Massachusetts: Harvard University Press, 1979.

Bronson, W.C. Exploratory behavior of 15-month-old infants in a novel situation. Paper presented at the meetings of the Society for Research in Child Development, Minneapolis, April, 1971.

Bronstein, A.I., Ituna, N.A., Kamenetskaia, A.G., & Sytova, V.A. The orienting reactions of newborn children. In L. G. Voronin, A.N. Leontiev, A.R. Luria, E.N. Sokolov, & O.S. Vinogradova (Eds.), *Orienting reflex and exploratory behavior*. Moscow: Academy of Pedagogical Sciences of RSFSR, 1958.

Brooks-Gunn, J., & Lewis, M. *Person perception and verbal labeling: The development of social labels*. A version of this paper was presented at both the Society for Research in Child Development meetings, Denver, April 1975 and the Eastern Psychological Association meetings, New York, April 1975.

Brooks-Gunn, J., & Lewis, M. Early social knowledge: the development of knowledge about others. In H. McGurk (Ed.), *Issues in Childhood Social Development*. London: Methuen & Co., Ltd., 1978.

Cattell, R. B. Research designs in psychological genetics with special reference to multiple variance. *American Journal of Human Genetics*, 1953, *5*, 76-91.

Cazden, C.B. *Child language and education*. New York: Holt, Rinehart and Winston, Inc., 1972.

Chase, H.P., Welch, N.N., Dabrere, C.S., Vasan, N.S., & Butterfield, L.J. Alterations in human brain biochemistry following intrauterine growth retardation. *Pediatrics*, 1972, *50*, 403-411.

Chatelanat, G., & Schoggen, M. Issues encountered in devising an observational system to assess spontaneous infant behavior-environment interactions. In J. Hogg & P.J. Mittler (Eds.), *Advances in mental handicap research*. London: Wiley, 1980.

Cicchetti, D., & Sroufe, L.A. The relationship between affective and cognitive development in Down's Syndrome infants. *Child Development*, 1976, *47*,. 920-929.

Cicchetti, D., & Sroufe, L.A. An organizational view of affect: Illustration from the study of Down's Syndrome infants. Paper presented at a conference, The origins of behavior: Affect development, Educational Testing Service, Princeton, N.J., February 1977.

Clements, S.D., & Peters, J.E. Minimal brain dysfunctions in the school-age child. *Archives of General Psychiatry*, 1962, *6*, 185.

Clifton, R., Siqueland, E.R., & Lipsitt, L.P. Conditioned head turning in human newborns as a function of conditioned response requirements and states of wakefulness. *Journal of Experimental Child Psychology*, 1972, *13*, 43-57.

Coates, D.L., & Lewis, M. *Relationships between cognitive behavior at six years and mother-infant interaction at three months*. Paper presented at the International Conference on Infant Studies, New Haven, Connecticut, April 1980.

Cohen, L.B. Attention-getting and attention-holding processes of infant visual preferences. *Child Development*, 1972, *43*(3), 869-879.

Cohen, L.B., & Gelber, E.R. Infant visual memory. In L. Cohen & P. Salapatek (Eds.), *Infant perception: From sensation to cognition, Vol. 1. Basic visual processes*. New York: Academic Press, 1975.

Cohen, L.B., & Hanson, M. Intersensory processing efficiency of fluent speakers and stutterers. *British Journal of Disorders of Communication*, 1975, *10*(2), 111-122.

Cohen, L.B., & Salapatek, P. *Infant perception: From sensation to cognition (Vol. 1): Basic visual processes*. New York: Academic Press, 1975. (a)

Brooks-Gunn, J., & Lewis, M. *Handicapped infants and their mothers at play*. Paper presented at the Annual Meeting of the American Psychological Association, New York, September 1979.

Broussard, E., & Hartner, M. Maternal perception of the neonate as related to development. *Child Psychology and Human Development*, 1970, *1*(1), 16-25.

Brown, R. The development of Wh questions in child speech. *Journal of Verbal Learning and Verbal Behavior*, 1968, *7*, 279-290.

Brown, R. *A first language*. Cambridge: Harvard University Press, 1973.

Bruner, J. From communication to language: A psychological perspective. *Cognition*, 1975, *3*, 255-287.

Bruner, J. S. The ontogenesis of speech arts. *Journal of Child Language*, 1975, *2*, 1-19.

Buckhalt, J., Rutherford, R., & Goldberg, K. Verbal and nonverbal intervention of mothers with their Down's syndrome and nonretarded infants. *American Journal of Mental Deficiency*, 1978, *82*, 337-343.

Buckley, W. *Sociology and modern systems theory*. Englewood Cliffs, N.J.: Prentice-Hall, 1967.

Buium, N., Rynders, J., & Turnure, J. Early maternal linguistic environment of normal and Down's syndrome language learning children. *American Journal of Mental Deficiency*, 1974, *79*, 52-58.

Burt, C., Jones, E., Miller, E., & Moodie, W. *How the mind works*. New York: Appleton-Century-Crofts, 1934.

Bzoch, K., & League, R. *Bzoch-League*. Gainesville, Fla: Anhinga Press, 1971.

Cameron, P. Age parameters of young adult, middle-aged, old, and aged. *Journal of Gerontology*, 1969, *24*, 201-202.

Carey, W.B. *Temperament Questionnaire*. NAPS Document Number 01044, circa 1970.

Carey, W.B. A simplified method for measuring infant temperament. *The Journal of Pediatrics*, 1970, *77*(2), 188-194.

Caron, R.F. Visual reinforcement of head-turning in young infants. *Journal of Experimental Child Psychology*, 1967, *5*, 489-511.

Caron, R.F., Caron, A.J., & Caldwell, R.C. Satiation of visual reinforcement in young infants. *Developmental Psychology*, 1971, *5*, 279-289.

Cattell, R. B. *Factor analysis: An introduction and manual for the psychologist and social scientist*. New York: Harper, 1952.

Collard, R.R. Social and play responses of first-born and later-born infants in an unfamiliar situation. Child Development, 1968, 39, 325-334.

Cooper, L.A. Rubella: A preventable cause of birth defects. In D. Bergsma (Ed.), Birth defects: Original article series, Vol. IV: Intrauterine infections. New York: The National Foundation - March of Dimes, 1968.

Cornell, E.H., & Gottfried, A.W. Intervention with premature human infants. Child Development, 1976, 47, 32-39.

Cox, R.N., & Campbell, D. Young children in a new situation with and without their mothers. Child Development, 1968, 39, 123-131.

Cross, T. Mothers' speech adjustments: The contribution of selected child listener variables. In Snow and Ferguson (Eds.), Talking to children: Language input and acquisition. Cambridge, Massachusetts: Cambridge University Press, 1977.

Crothers, G., & Paine, R.S. The natural history of cerebral palsy. Cambridge, Mass.: Harvard University Press, 1959.

Cruickshank, W.M., & Rans, G.M. Cerebral palsy: Its individual and community problems. Syracuse, N.Y.: Syracuse University Press, 1955.

Darwin, C. The descent of man and selection in relation to sex. (New ed.), New York: Appleton, 1897.

Davies, P.A., & Tizard, J.P.M. Very low birth weight and subsequent neurological defect. Developmental Medicine and Child Neurology, 1975, 17, 3-17.

Desmond, M., Wilson, G., Melnick, J., Singer, D., Zion, T.S., Rudolph. A.J., Pineda, R.G., Ziai, M., & Blattner, R.J. Congenital rubella encephalitis: Course and early sequelae. Journal of Pediatrics, 1967, 71(3), 311-331.

Detterman, D.K. Memory in the mentally retarded. In N.R. Ellis (Ed.), Handbook of mental deficiency, psychological theory and research. Hillsdale, N.J.: Lawrence Erlbaum, 1979.

Dewey, J. Democracy and education. New York: Macmillen, 1916.

Dicks-Mireaux, M.J. Mental development of infants with Down's Syndrome. American Journal of Mental Deficiency, 1972, 77(1), 26-32.

Diller, L. Psychological aspects of physically handicapped children. In B. Walman (Ed.), Manual of child psychopathology. New York: McGraw-Hill, 1972.

Diller, L., & Birch, H.G. Psychological evaluation of children with cerebral damage. In H. G. Birch (Ed.), Brain damage in children: Biological and social aspects. Baltimore: Williams and Wilkins, 1964.

Donaldson, M. *Children's minds*. London: Gontana, 1978.

Dore, J. Holophrases, speech acts, and language universals. *Journal of Child Language*, 1975, *2*, 21-40.

Drage, J.S., & Berendes, H. Apgar scores and outcome of the newborn. *Pediatric Clinics of North America*, 1966, *13*, 635-643.

Drevenstedt, J. Perceptions of onsets of young adulthood, middle-age, and old age. *Journal of Gerontology*, 1976, *31*, 53-57.

Drillien, C.M. *The growth and development of the prematurely born infant*. Edinburgh: Livingston, 1964.

Dubowitz, L., Dubowitz, B., & Goldberg, C. Clinical assessment of gestational age in the newborn infant. *Journal of Pediatrics*, 1970, *77*, 1.

Dunst, C.J. Developmental characteristics of communicative acts among Down's Syndrome infants and nonretarded infants. Paper presented at the biennial meeting of the Southeastern Conference on Human Development, Alexandria, Virginia, April 1980.

Eaves, L.C., Nuttall, J.C., Klonoff, H., & Dunn, H.G. Developmental and psychological test scores in children of low birth weight. *Pediatrics*, 1970, *45*, 9.

Erikson, E.H. *Childhood and society*. New York: W.W. Norton, 1937, London: W.W. Norton, 1950.

Escalona, S. *The Roots of Individuality*. Chicago: Aldine, 1968.

Estes, W.K. Reinforcement in human behavior. *American Scientist,* 1972, *60*, 723-729.

Etzel, B.C., & Gewirtz, J.L. Experimental modification of caretaker maintained high rate operant in a 6- and a 20-week-old infant (infans tyrannotearus): Extinction of crying with reinforcement of eye contact and smiling. *Journal of Experimental Child Psychology*, 1967, *5*, 303-317.

Fagan, J. Infant recognition memory as a present and future index of cognitive abilities. In N.R. Ellis (Ed.), *Aberrant development in infancy: Human and animal studies.* Potomac, Md.: Erlbaum, 1975.

Fagen, J.W. Interproblem learning in 10-month-old infants. *Child Development*, 1977, *48*, 786-796.

Fagen, J.W., & Rovee, C.K. Effect of quantitative shifts in a visual reinforcer on the instrumental response of infants. *Journal of Experimental Child Psychology*, 1976, *21*, 349-360.

Fagen, J.W., Rovee, C.K., & Kaplan, M.G. Psychophysical scaling of stimulus similarity in 3-month-old infants. *Journal of Experimental Child Psychology*, 1976, *21*, 349-360.

Fantz, R.L. A method for studying early visual development. *Perceptual and Motor Skills*, 1956, *6*, 13-16.

Fantz, R.L. Pattern vision in young infants. *Psychological Record*, 1958, *8*, 43-48.

Fantz, R.L. The origin of form perception. *Scientific American,* 1961, *204*(5), 66-72.

Fantz, R.L. Pattern vision in newborn infants. *Science*, 1963, *140*, 296-297.

Fantz, R.L. Visual perception from birth as shown by pattern selectivity. *Annals of the New York Academy of Science*, 1965, *118*, 793-814.

Farr, V., Kerridge, D., & Mitchell, R. The value of some external characteristics in the assessment of gestational age at birth. *Developmental Medicine and Child Neurology*, 1966, *8*, 657.

Federal Register, 1975, *40*(35), February.

Feshback, N., & Roe, K. Empathy in six and seven year olds. *Child Development*, 1968, *39*, 133-145.

Feuerstein, R. *Instrumental enrichment: An intervention program for cognitive modifiability*. Baltimore: University Park Press, 1979.

Feuerstein, R. *The dynamic assessment of retarded performers*. Baltimore, Md.: University Park Press, 1970.

Field, T.M. Effects of early separation, interactive deficits, and experimental manipulations on mother-infant interaction. *Child Development*, 1977, *48*, 763-771.

Field, T. Interaction patterns of preterm and term infants. In T. Field (Ed.), *Infants born at risk*. New York: Spectrum, 1979.

Field, T. Self, teacher, toy, and peer-directed behaviors of handicapped preschool children. In T. Field (Ed.), *High-risk infants and children: Adult and peer interactions*. New York: Wiley, 1980.

Field, T., Sostek, A., Goldberg, S., & Shuman, H.H. (Eds.). *Infants born at risk*. Jamaica, N.Y.: Spectrum Publications, Inc., 1979.

Filler, J.W., Robinson, C.C., Smith, R.A., Vincent-Smith, L.J., Bricker, D.D., & Bricker, W.A. Mental retardation. In N. Hobbs (Ed.), *Issues in the classification of children* (Vol. 1). San Francisco: Jossey-Bass, 1975.

Finkelstein, N.W., & Ramey, C.T. Learning to control the environment in infancy. *Child Development*, 1977, *48*, 806-819.

Flowers, K. Handedness and controlled movement. *British Journal of Psychology*, 1975, *66*, 39-52.

Forsberg, S.J., Neisworth, J.T., & Laub, K.W. *Comp curriculum*. State College of Pennsylvania: The Pennsylvania State University, 1977.

Fox, N. The use of infant tests for prediction of childhood intelligence. Unpublished manuscript, 1978.

Fox, N., & Lewis, M. The role of maturation and experience in preterm development. In J. Gallagher (Ed.), *New directions in special education*. San Francisco: Jossey-Bass, in press.

Fox, N., Kagan, J., & Weiskopf, S. The growth of memory in the first year. *Monographs of the Journal of Genetic Psychology*, 1979.

Friedlander, B.Z., Sterritt, G.M., & Kirk, G.E. (Eds.), *Exceptional infant, Vol. 3: Assessment and intervention*. New York: Brunner/Mazel, 1975.

Friedman, S. Habituation and recovery in the alert human newborn. *Journal of Experimental Child Psychology*, 1972, *13*, 339-349.

Friedman, S., & Sigman, M. (Eds.), *Preterm birth and psychological development*. New York, New York: Academic Press, 1981.

Gallas, H., & Lewis, M. Mother-infant interaction and cognitive development in the 12-week-old infant. 1977, unpublished manuscript.

Gardner, J., Lewkowitz, D., & Turkewitz, G. Development of postural asymmetry in premature human infants. *Developmental Psychobiology*, 1977, *10*, 471-480.

Gesell, A., & Amatruda, C. *Developmental diagnosis: Normal and abnormal child development, clinical methods and practical applications*. (3rd Ed.), New York: Harper, 1962.

Glanville, B.B., Best, C.J., Levinson, R. A cardiac measure of cerebral asymmetries in infant auditory perception. *Developmental Psychology*, 1977, *13*, 54-59.

Goldberg, S., & Lewis, M. Play behavior in the year-old infant: Early sex differences. *Child Development*, 1969, *40*, 21-32.

Gould, S.J. *The mismeasurement of man*. New York: Norton, 1981.

Graham, F.K., Caldwell, B.M., Ernhard, C.B., Pennoyer, M.M., & Hartmann, A.F. Anoxia as a significant perinatal experience: A critique. *Journal of Pediatrics*, 1957, *50*, 556-559.

Graham, F.K., & Clifton, R.K. Heart rate change as a component of the orienting response. *Psychological Bulletin*, 1966, *65*, 305-320.

Gratch, G. Recent studies based on Piaget's view of object concept development. In L. Cohen & P. Salapatek, *Infant perception: From sensation to cognition, Vol. II*. New York: Academic Press, 1975.

Greenfield, P.M., & Smith, J.H. Communications and the beginnings of language: The development of semantic structures in one-word speech and beyond. New York: Academic Press, 1976.

Gruenwald, P. Infants of low birth weight among 5,000 deliveries. Pediatrics, 1964, 34, 157.

Guilford, J.P. The structure of intellect. Psychological Bulletin, 1956, 53, 267-293.

Haith, M.M., & Campos, J.J. Human infancy. Annual Review of Psychology, 1977.

Haith, M.M., Kessen, W., & Collins, D. Response of the human infant to level of complexity of intermittent visual movement. Journal of Experimental Child Psychology, 1969, 7, 52-69.

Hammill, D., & Larsen, S. The relationship of selected auditory and perceptual skills and reading ability. Journal of Learning Disabilities, 1974, 7(7), 429-436.

Hanson, M.J. Teaching your Down's syndrome infant. Baltimore, Md.: University Park Press, 1977.

Hart, V. The blind child who functions on a retarded level: The challenge for teacher preparation. New Outlook for the Blind, 1969, 63, 318-321.

Hartka, E., & Lewis, M. Age changes in contingent learning. Paper presented at the Annual Meeting of the Eastern Psychological Association, New York, April 1981.

Hauesserman, E. Developmental potential of preschool children. New York: Grune & Stratton, 1958.

Haugan, G.M., & McIntire, R.W. Comparisons of vocal imitation, tactile stimulation and food as reinforcers for infants' vocalizations. Developmental Psychology, 1972, 6, 201-209.

Hayden, A.H., & Dmitriev, V. The multidisciplinary preschool program for Down's Syndrome children at the University of Washington Model Preschool Center. In B.Z. Friedlander, G.M. Sterritt, & G. E. Kirk (Eds.), Exceptional Infant Vol. 3: Assessment and intervention. New York: Brunner/Mazel, 1975.

Hewitt, F., & Forness, S. Education of exceptional learners (2nd ed.). Boston: Allyn & Bacon, 1977.

Hillman, D., & Bruner, J.S. Infant sucking in response to variation in schedules of feeding reinforcement. Journal of Experimental Child Psychology, 1972, 13, 240-247.

Hnatiow, M., & Lang, P.J. Learned stabilization of cardiac rate. Psychophysiology, 1965, 1, 330-336.

Hoffman, M.L. Toward a theory of empathic arousal and development. In M. Lewis & L. A. Rosenblum (Eds.), The development of affect. New York: Plenum, 1978.

Holland, P.W. & Leinhardt, S. (Eds.), Perspectives on social network research. New York: Academic Press, 1979.

Holloway, G.F. Auditory-visual integration in language-delayed children. Journal of Learning Disabilities, 1971, 4(4), 204-208.

Honzik, M.P. Value and limitations of infant tests: An overview. In M. Lewis (Ed.), Origins of intelligence: Infancy and early childhood. New York: Plenum Press, 1976.

Horowitz, F. Stability and instability in the newborn infant: The quest for elusive threads. Paper presented at the Society for Research in Child Development meetings, New Orleans, April 1977.

Howard, J., Parmelee, A., Kopp, C., & Littman, B. A neurologic comparison of pre-term and full term infants at term conceptual age. Journal of Pediatrics, 1976, 88(6), 995-1002.

Hunt, J. McV. Experience and the development of motivation: Some reinterpretations. Child Development, 1960, 31, 489-504.

Hunt, J. Intelligence and experience. New YorK; Ronald Press, 1961.

Hunt, J. V. Predicting intellectual disorders in childhood for preterm infants with birthweights below 1501 grams. In S. Friedman & M. Sigman (Eds.), Preterm birth and psychological development. New York: Academic Press, 1981.

Hunter, M.A., & Ames, E.W. Visual habituation and preference for novelty in five week old infants. Paper presented at meeting of the Society for Research in Child Development, Denver, 1975.

Inhelder, B., & Piaget, J. The early growth of logic in the child. New York: Harper & Row, 1964.

Irwin, O.C. Infant speech: Variability and the problem of diagnosis. Journal of Speech and Hearing Disorders, 1947, 12, 287-289.

Izard, C.E., & Dougherty, L.M. The maximally discriminative facial movement coding system. Neward, Del.: Delaware University, Instructional Resource Center, 1980.

Jacklin, C.N., Maccoby, E.E., & Dick, A.E. Barrier behavior and toy preference: Sex differences (and their absence) in the year-old child. Child Development, 1973, 44, 196-200.

James, L. Onset of breathing and resuscitation. Journal of Pediatrics, 1964, 65, 807.

James, W. The principles of psychology. New York: Henry Holt, 1890.

Jaskir, J., & Lewis, M. A factor analytic study of mother-infant interaction at 3, 12 and 24 months. Paper presented at the Annual Meeting of the Eastern Psychological Association, New York, April 1981.

Jones, O. M. Mother-child communication with pre-linguistic Down's syndrome and normal infants. In H.R. Schaffer (Ed.), Studies in mother-infant interaction. London: Academic Press, 1977.

Jones, O. M. Prelinguistic communication skills in Down's syndrome and normal infants. In T. Field (Ed.), High-risk infants and children: Adult and peer interactions. New York: Academic Press, 1980.

Kagan, J., & Moss, H. A. Birth to maturity. New York: Wiley, 1962.

Kagan, J., & Rosman, B. L. Cardiac and respiratory correlates of attention and an analytic attitude. Journal of Child Psychology, 1964, 1, 50-63.

Kaye, H. The effects of feeding and tonal stimulation on non-nutritive sucking in the human newborn. Journal of Experimental Child Psychology, 1966, 3, 131-145.

Kelly, T.J., Bullock, L.M. & Kykes, M.K. Behavioral disorders: Teacher's perceptions. Exceptional Children, 1977, 43, 316-318.

Kennard, M.A. Value of equivocal signs in neurologic diagnosis. Neurology, 1960, 10, 753.

Kennel, J.H., Chester, D., Wolfe, H., & Klaus, M.H. Nesting in the human mother after mother-infant separation. Pediatric Research, 1973, 7, 269.

Kimura, D. Speech lateralization in young children as determined by an auditory test. Journal of Comparative and Physiological Psychology, 1963, 56, 899-901.

King, W., & Seegmiller, B. Performance of 12 22-month-old black, firstborn male infants on two tests of cognitive development: The Bayley scales and the infant psychological development scale. Developmental Psychology, 1973, 8, 317-326.

Kirk, S., & Elkins, J. Characteristics of children enrolled in the Child Service Demonstration Centers. Journal of Learning Disabilities, 1975, 8, 630-637.

Kishi, G. The multiply handicapped child: An educational dilemma. Educational Perspective, 1974, 13(3), 9-12.

Klaus, M.H., Faranoff, A.A. (Ed.). Care of the high risk neonate. Philadelphia: Saunders, 1972.

Klaus, M.H., Jerauld, R., Kreger, N., McAlpine, W., Steffa, M., & Kennel, J.H. Maternal attachment: Importance of the first post-partum days. New England Journal of Medicine, 1972, 256, 460-463.

Klaus, M., & Kennel, J. Maternal-infant bonding. St. Louis, MO: Mosby, 1976.

Koch, R., & de la Cruz, F.F. (Eds.). Down's Syndrome (Mongolism). New York: Brunner/Mazel, 1975.

Kogan, K.L. Interaction systems between preschool handicapped or developmentally delayed children and their parents. In T.M. Field (Ed.), High-risk infants and children: Adult and peer interactions. New York: Academic Press, 1980.

Kogan, N., Stephens, J., & Shatton, F. Age differences: A developmental study of discriminability and affective response. Journal of Abnormal and Social Psychology, 1961, 62(2), 221-230.

Kopp, C., Sigman, M., & Parmelee, A. Longitudinal study of sensory-motor development. Developmental Psychology, 1974, 10.

Kreitzberg, V., & Lewis, M. A factor analytic study of the Bayley Mental Scale of Infant Development. Paper presented at the Eastern Psychological Association meetings, Washington, D.C., April 1978.

Krogman, W.M., Brackbill, Y., Conway, E., & Steinschneider, A. The effects of obstetrical medication on fetus and infant. Monographs of the Society for Research in Child Development, 1970, 35(4).

Lacey, J.I. Somatic response patterning and stress. Some revisions of activation theory. In M.H. Appley & R. Trumbull (Eds.), Psychological stress: Issues in research. New York: Appleton Century Crofts, 1967.

Lang, P.J., Sroufe, A., & Hastings, J.E. Effects of feedback and instrumental set on the control of cardiac rate variability. Journal of Experimental Psychology, 1967, 75, 425-431.

Langhurst, T.M., & Stepanich, L. Mothers' speech addressed to one, two, and three year old normal children. Child Study Journal, 1975, 5, 3-11.

Leifer, A.D., Leiderman, P.H., Barnett, C.R., & Williams, J.A. Effects of mother-infant separation on maternal attachment behavior. Child Development, 1972, 43, 1203-1218.

Leifer, J., & Lewis, M. Maternal speech to normal and handicapped children. Presented at International Conference on Infant Studies, New Haven, Connecticut, April 1980.

Levitt, E., & Cohen, S. Attitudes of children toward their handicapped peers. Childhood Education, 1976, 52, 171-173.

Lewis, M. Neonatal distress, measurement and prediction. Journal of the American Medical Association, 1967, 200(3), 157-158. Editorial.

Lewis, M. The meaning of a response or why researchers in infant behavior should be oriental metaphysicians. Merrill-Palmer Quarterly, 1967, 13(1), 7-18.

Lewis, M. Infants' responses to facial stimuli during the first year of life. Developmental Psychology, 1969, 1, 75-86.

Lewis, M. Individual differences in the measurement of early cognitive growth. In J. Hellmuth (Ed.), Exceptional infant, Vol. 2. New York: Brunner/Mazel, 1971.

Lewis, M. State as an infant-environment interaction: An analysis of mother-infant interaction as a function of sex. Merrill-Palmer Quarterly, 1972, 18(2), 95-121.

Lewis, M. Infant intelligence tests: Their use and misuse. Human Development. 1973, 16. 108-118.

Lewis, M. The development of attention and perception in the infant and young child. In W.M. Cruickshank & D.P. Hollahan (Eds.), Perceptual and learning disabilities in children, Vol. 2. Syracuse: Syracuse University Press, 1975.

Lewis, M. Origins of intelligence: Infancy and early childhood. New York: Plenum Press, 1976.

Lewis, M. The busy purposeful world of a baby. Psychology Today, February, 1977.

Lewis, M. The infant and its caregiver: The role of contingency. Paper presented at a Conference on Infant Intervention Programs. The University of Wisconsin Milwaukee, Wisconsin, June 1977. Also in, Allied Health and Behavioral Sciences, 1 (4), in press.

Lewis, M., & Baldini, N. Attentional processes and individual differences. In G. Hale & M. Lewis (Eds.), Attention and cognitive development. New York: Plenum, 1979.

Lewis, M., Bartels, B., Campbell, H., & Goldberg, S. Individual differences in attention: The relationship between infants' condition at birth and attention distribution in the first year. American Journal of Diseases of Children, 1967, 113, 461-465.

Lewis, M., & Brooks-Gunn, J. Social cognition and the acquisition of self. New York: Plenum, 1979.

Lewis, M., & Brooks-Gunn, J. Toward a theory of social cognition: The development of self. In I. Uzgiris (Ed.), New directions in child development: Social interaction and communication during infancy. San Francisco: Jossey-Bass, 1979.

Lewis, M., & Brooks-Gunn, J. The self as social knowledge. In M. D. Lynch, A. Norem-Habeisen, & K. Gergen (Eds.), Self-concept: Advances in theory and research. Cambridge, Mass.: Balinger, 1980.

Lewis, M., & Cherry, L. Social behavior and language acquisition. In M. Lewis & L.A. Rosenblum (Eds.), Interaction, conversation and the development of language: The origins of behavior, Vol. V. New York: Wiley, 1977.

Lewis, M., & Coates, D.L. Mother-infant interactions and cognitive development in twelve-week-old infants. *Infant Behavior and Development*, 1980, *3*, 95-105.

Lewis, M., Dodd, C., & Horwitz, M. Cardiac responsivity to tactile stimulation in waking and sleeping infants. *Perceptual and Motor Skills*, 1969, *29*, 259-269.

Lewis, M., & Feiring, C. The child's social network: Social object, social functions, and their relationship. In M. Lewis and L.A. Rosenblum (Eds.), *The child and its family*, New York: Plenum, 1979.

Lewis, M, & Feiring, C. Some American families at dinner. In L. Laosa and I. Sigel (Eds.), *The family as a learning environment (Vol I)*. New York: Plenum, in press.

Lewis, M., & Freedle, R. Mother-infant dyad: The cradle of meaning. In P. Pliner, L. Kramer, & T. Alloway (Eds.), *Communication and affect: Language and thought*. New York: Academic Press, 1973.

Lewis, M., & Goldberg, S. The acquisition and violation of expectancy: An experimental paradigm. *Journal of Experimental Child Psychology*, 1969, *7*, 70-80.

Lewis, M., & Goldberg, S. Perceptual-cognitive development in infancy: A generalized expectancy model as a function of the mother-infant interaction. *Merrill-Palmer Quarterly*, 1969, *15*(1), 81-100.

Lewis, M., Goldberg, S., & Campbell, H. A developmental study of learning within the first three years of life: Response decrement to a redundant signal. *Monographs of the Society for Research in Child Development*, 1969, *34*(9).

Lewis, M., Kagan, J., & Kalafat, J. Patterns of fixation in infants. *Child Development*, 1966, *37*, 331-341.

Lewis, M., Kagan, J., Kalafat, J., & Campbell, H. The cardiac response as a correlate of attention in infants. *Child Development*, 1966, *36*, 63-71.

Lewis, M., & Lee-Painter, S. An interactional approach to the mother-infant dyad. In M. Lewis & L. Rosenblum (Eds.), *The effect of the infant on its caregiver: The origins of behavior, Vol. I*. New York: Wiley, 1974.

Lewis, M., & McGurk, H. Evaluation of infant intelligence. *Science*, 1972, *178*, 1174-1177.

Lewis, M., & Michalson, L. Scales of socioemotional development. Unpublished manuscript, Educational Testing Service, 1975.

Lewis, M., & Rosenblum, L (Eds). *The effect of the infant on its caregiver: The origins of behavior, Vol. I.* New York: Wiley, 1974.

Lewis, M., & Wehren, A. The tyranny of the central tendency and other problems in studying the handicapped child. In D. Bricker (Ed.), *Application of research findings to intervention with at-risk and handicapped infants*. Baltimore, Md.: University Park Press, in press.

Lewis, M., Weinraub, M., & Ban, P. *Mothers and fathers, girls and boys: Attachment behavior in the first two years of life*. Paper presented at the Society for Research in Child Development meetings, Philadelphia, March 1973. Also Research Bulletin 72-60. Princeton, N.J.: Educational Testing Service, 1972.

Lipsitt, L.P., & Kaye, H. Conditioned sucking in the human newborn. *Psychonomic Science*, 1964, *1*, 29-30.

Littman, B., & Parmelee, A.H. Medical correlates of infant development. *Pediatrics*, 1978, *61*(3), 470-474.

Lomas, J., & Kimura, D. Intrahemispheric interaction between speaking and sequential manual activity. *Neuropsychologia*, 1976, *14*, 23-33.

Lubchenco, L., Hansman, C., & Dressler, M. Intrauterine growth as estimated. from liveborn birth weight data at 24-42 weeks of gestation. *Pediatrics*, 1963, *32*, 793.

Macpherson, C., & Olson, M. Mother speech input to deficient and language normal children. Presented at Conference on Research in Child Language Disorders, Madison, Wisconsin, 1980.

Mahler, M.S. *The Psychological Birth of the Human Infant*, New York: Basic, 1975.

Main, M. Analysis of a peculiar form of reunion behavior seen in some day care children: Its history and sequelae in children who are home-reared. In R. Webb (Ed.), *Social development in daycare*. Baltimore: Johns Hopkins University Press, 1977.

Marshall, N., Hegrenes, J., & Goldstein, S. Verbal interactions: Mothers and their retarded children versus mothers and their nonretarded children. *American Journal of Mental Deficiency*, 1973, *77*, 415-419.

Mast, V.K. Fagen, J.W., Rovee-Collier, C.K., & Sullivan, M.W. Immediate and long-term memory for reinforcement context: The development of learned expectancies in infancy. *Child Development*, 1980, *51*, 700-707.

Matas, L., Ahrend, R.A., & Sroufe, L.A. Continuity of adaptation in the second year: The relationship between quality of attachment and later competence. *Child Development*, 1978, *49*, 547-556.

McCall, R.B. Attention in the infant: Avenue to the study of early cognitive development. In D. Walcher & D. Peters (Eds.), *Early childhood: The development of self-regulatory mechanisms*. New York: Academic Press, 1971.

McCall, R.B. Exploratory maniupulation and play in the human infant. *Monographs of the Society for Research in Child Development*, 1974, *39*(2), Serial No. 155.

McCall, R.B., Applebaum, M.I., & Hogarty, P.S. Developmental changes in mental performance. Monographs of the Society for Research in Child Development, 1973, 38(3), Whole no. 150.

McCall, R.B., Eichorn, D.H., & Hogarty, P.S. Transitions in early mental development. Monographs of the Society for Research in Child Development, 1977, 42(3, Serial No. 171).

McCall, R.B., Hogarty, P.S., & Hurlburt, N. Transitions in infant sensorimotor development and the prediction of childhood IQ. American Psychologist, 1972, 27, 728-748.

McCarthy, D. Language development. In L. Carmichael (Ed.), Manual of child psychology. New York: John Wiley, 1954.

McGurk, H., & Lewis, M. Space perception in early infancy: Perception within a common auditory-visual space? Science, 1974, 186(4164), 649-650.

McKirdy, L.S., & Rovee, C.K. The efficacy of auditory and visual conjugate reinforcers in infant conditioning. Journal of Experimental Child Psychology, 1978, 25, 80-89.

McNeill, D. The acquisition of language: The study of developmental psycholinguistics. New York: Harper & Row, 1970.

McNeill, D. Developmental psycholinguistics. In F. Smith & G. Miller (Eds.), The genesis of language. Cambridge, Mass.: M.I.T. Press, 1966.

Meadows, K. Development of deaf children. In E. M. Hetherington (Ed.), Review of Child Development Research, Vol 5. Chicago: University of Chicago Press, 1975.

Meier, J. Screening and assessment of young children at developmental risk. Washington, D.C.: The Presidnet's Committee on Mental Retardation, 1973.

Messer, D. The integration of mothers' referential speech with joint play. Child Development, 1978, 781-787.

Messer, S.B., & Lewis, M. Social class and sex differences in the attachment and play behavior of the year-old infant. Merrill-Palmer Quarterly. 1972, 13, 295-306.

Millar, W.S. A study of operant conditioning under delayed reinforcement in early infancy. Monographs of the Society for Research in Child Development. 1972, 37(3), Serial No. 147.

Minde, K., Ford, L., Celhoffer, L., & Boukdis, C. Interactions of mothers and nurses with premature infants. Canadian Medical Association Journal, 1975, 113, 741.

Miranda, S.B. Visual attention in defective and high-risk infants. Merrill-Palmer Quarterly, 1976, 22.

Miranda, S.B., & Fantz, R.L. Visual preferences of Down's Syndrome and normal infants. Child Development, 1973, 44, 555-561.

Miranda, S.B., & Fantz, R.L. Recognition memory in Down's Syndrome and normal infants. Child Development, 1974, 45, 651-660.

Mitchell, D.R. Down's syndrome children in structured dyadic communication situations with their parents. In J. Hogg & P. Mittler (Eds.), Advances in Mental Handicap Research (Vol. 1). Chichester, England: John Wiley & Sons, Inc., 1980.

Molfese, D.L., Freeman, R.B., & Palermo, D.S. The ontogeny of brain lateralization for speech and nonspeech stimuli. Brain and Language, 1975, 2, 356-368.

Nelson, K. Structure and strategy in learning to talk. Monographs of the Society for Research in Child Development, 1973, No. 149.

Nelson, K.E., & Bonvillian, J. Early language development: Conceptual growth and related processes between 2 and 4.6 years of age. In K. E. Nelson (Ed.), Children's language (Vol. 1). New York: Gardner Press, 1978.

Newhoff, M., Silverman, L., & Millett, A. Linguistic differences in parents' speech to normal and language disordered children. Presented at a conference on Research in Child Language Disorders, Madison, Wisconsin, 1980.

Newkirk, D., Bloch, D., & Shvybman, J. An analysis of categorical definitions, diagnostic methods, diagnostic criteria, and personnel utilization in the classification of handicapped children. Reston, Virginia: Council for Exceptional Children, 1978.

Newport, E., Gleitman, H., & Gleitman, L. Mother, I'd rather do it myself: Some effects and noneffects of maternal speech style. In Snow & Ferguson (Eds.), Talking to children: Language input and acquisition. New York: Cambridge University Press, 1977.

Nielson, G., Collins, S., Meisel, J., Lowry, M., Engh, H., & Johnson, D. An intervention program for atypical infants. In B.Z. Friedlander, G.M. Sterritt & G.E. Kirk (Eds.), Exceptional infant, Vol. 3: Assessment and intervention. New York: Brunner/Mazel, 1975.

Osofsky, J. Neonatal characteristics and mother-infant interaction in two observational situations. Child Development, 1976, 47, 1138-1147.

Osofsky, J., & Conners, K. Mother-infant interaction: An integrative view of a complex system. In J. Osofsky (Ed.), Handbook of infant development. New York: Wiley, 1979.

Page, E.B. Miracle in Milwaukee. In B.Z. Friedlander, G.M. Sterritt, & G.E. Kirk (Eds.), Exceptional infant, Vol. 3: Assessment and intervention. New York: Brunner/Mazel, 1975.

Parmelee, A.H., & Haber, A. Who is the "risk infant"? Clinical Obstetrics and Gynecology, 1973, 376-387.

Parmelee, A., & Michaelis, R. Neurological examination of the newborn. In J. Hellmuth (Ed.), Exceptional infant, Vol. 2: Studies in abnormalities. New York: Brunner/Mazel, 1975.

Papousek, H., & Bernstein, P. The functions of conditioning and stimulation in human neonates and infants. In D. Ambrose (Ed.), Stimulation in early infancy. New York: Academic Press, 1969.

Pattison, E.M., Defrancisco, D., Wood, P., Frazier, H., & Crowder, J. A psychosocial kinship model for family therapy. American Journal of Psychiatry, 1975, 132(12), 1246-1251.

Perlstein, M.A. Infantile cerebral palsy classification and clinical correlations. Journal of the American Medical Association, 1952, 149, 32-34.

Philips, J. Syntax and vocabulary of mothers' speech to young children: Age and sex comparisons. Child Development, 1973, 44, 182-185.

Piaget, J. The psychology of intelligence. M. Piercy and D.E. Berlyne (Trans), Paterson, N.J.: Littlefield, Adams & Co., 1960. (Orig. 1947).

Piaget, J. (1954) The origins of intelligence in children. M. Cook (Trans). New York: W.W. Norton, 1963.

Porges, S.W., Arnold, W.R., & Forbes, E.J. Heart rate variability: An index of attentional responsivity in human newborns. Developmental Psychology, 1973, 8, 85-92.

Porges, S.W., & Humphrey, M.M. Cardiac and respiratory responses during visual search in non-retarded children and retarded adolescents. American Journal of Mental Deficiency, 1977, 82, 162-169.

Porges, S.W., & Raskin, D.C. Respiratory and heart rate components of attention. Journal of Experimental Psychology, 1969, 81, 497-503.

Porter, R.H., Ramsey, B., Tremblay, A., Iaccobo, M., & Crawly, S. Social interactions in heterogeneous groups of retarded and normally developing children: An observational study. In G. Sackett (Ed.), Observing behavior: Theory and applications in mental retardation (Vol. 1). Baltimore, Md.: University Park Press, 1978.

Powell, L.F. The effect of extra stimulation and maternal involvement on the development of low birth weight infants and on maternal behavior. Child Development, 1974, 45, 106-113.

Prechtl, H.F.R. Neurological sequelae of prenatal and paranatal complications. In L.J. Stone, H.T. Smith, & L.B. Murphy (Eds.), The competent infant. New York: Basic Books, 1976.

Prayer, W. Mind of the child. H. Brown (Trans.). New York: Appleton, 1888.

Provence, S., & Lipton, R.C. Infants in institutions. New York: International University Press, 1962.

Ramey, C.T., & Ourth, L.L. Delayed reinforcement and vocalization rates of infants. Child Development, 1971, 42, 291-298.

Ramsey, D.S. Manual preference for tapping in infants. Developmental Psychology, 1979, 15, 437-442.

Ramsey, D.S. Onset of unimanual handedness in infants. Infant Behavior and Development, in press.

Ramsey, D.S., Campos, J.J., & Fenson, L. Onset of bimanual handedness in infants. Infant Behavior and Development, 1979, 2, 69-76.

Ray, J.S. Behavior of developmentally delayed and nondelayed toddler-age children: An ethological study. Unpublished doctoral dissertation. George Peabody College for Teachers, 1974.

Razran, C. The observable unconscious and the inferable conscious in current Soviet psychology: Interoceptive conditioning, semantic conditioning, and the orienting reflex. Psychological Review, 1961, 68, 81-147.

Read, K.H. The nursery school: Human relationships and learning (6th ed.). Philadelphia, Pennsylvania: Saunders, 1976.

Reilly, D.H. Note on relation of auditory-visual integration and intelligence. Perceptual and Motor Skills, 1973, 37(1), 138.

Rheingold, H.L. The effect of a strange environment on the behavior of infants. In B.M. Foss (Ed.), Determinants of infant behavior, Vol. 4. London: Methuen, 1969.

Rheingold, H.L., Gewirtz, J.L., & Ross, H.W. Social conditioning of vocalizations in the infant. Journal of Comparative and Physiological Psychology, 1959, 52, 68-73.

Richards, M.P.M. The development of communication in the first year of life. In J.S. Bruner & K.J. Connoly (Eds.), Competence in infancy. In press.

Robinson, H.B., & Robinson, N. Mental retardation. In P. Mussen (Ed.), Carmichael's manual of child psychology. New York: Wiley, 1970.

Rogers, M.G.H. The early recognition of handicapping disorders in childhood. Developmental Medicine and Child Neurology, 1971, 13, 88-101.

Rondal, J. Maternal speech to Down's Syndrome and normal children matched for mean length of utterance, In Myers (Ed.), Quality of life in severely and profoundly retarded people. Research foundations for improvement. Washington, D.C., A.A.M.D. Inc., 1978.

Ross, G. The development of concepts in the first 2 years of life. Unpublished manuscript, 1978.

Roth, S. A revised model of learned helplessness in humans. Journal of Personality, 1980, 48, 103-133.

Rovee, C.K., & Fagen, J.W. Extended conditioning and 24-hour retention in infants. Journal of Experimental Child Psychology, 1976, 21, 1-11.

Rovee, C.K., & Rovee, D.T. Conjugate reinforcement of infant exploratory behavior, Journal of Experimental Child Psychology, 1969, 8, 33-39.

Rovee-Collier, C.K., & Fagen, J.W. The retrieval of memory in early infancy. In L. Lipsitt & C.K. Rovee (Eds.), Advances in infancy research (Vol. 1). Norwood, N.J.: Ablex Publishing, 1981.

Rovee-Collier, C.K., & Gekoski, M. The economics of infancy: A review of conjugate reinforcement. In L. Lipsitt & H.W. Reese (Eds.), Advances in child development and behavior (Vol. 13). New York: Academic Press, 1979.

Rovee-Collier, C.K., & Sullivan, M.W. Organization of infant memory. Journal of Experimental Child Psychology: Human Learning and Memory, 1980, 6, 798-807.

Rovee-Collier, C.K., Sullivan, M.W., Enright, M.K., Lucas, E., & Fagen, J.W. Reactivation of infant memory. Science, 1980, 208, 1159-1161.

Ruder, K.J., & Smith, M.D. Issues in language training. In R. L. Schiefelbusch & L.L. Loyd (Eds.), Language perspectives: Acquisition, retardation and intervention. Baltimore: University Park Press, 1974.

Sameroff, A.J. The components of sucking in the human newborn. Journal of Experimental Child Psychology, 1968, 6, 607-623.

Sameroff, A.J., & Cavanaugh, P.J. Learning in infancy: A developmental perspective. In L.D. Osofsky (Ed.), Handbook of infant development. New York: Wiley, 1979.

Sameroff, A.J., & Chandler, M.J. Reproductive risk and the continuum of caretaking casualty. In F. Horowitz (Ed.), Review of child development research, Vol. 4. Chicago: University of Chicago Press, 1975.

Sanders, L. The regulation of exchange in the infant-caretaker system and some aspects of the content-content relationship. In M. Lewis & L. Rosenblum (Eds.), Interaction, conversation, and the development of language: The origins of behavior, Vol. V. New York: Wiley, 1977.

Schaeffer, E.S., & Bayley, M. Maternal behavior, child behavior and their intercorrelations from infancy through adolescence. Manual of Social Research in Child Development Serial No. 87, 28, No. 3, 1963.

Schaeffer, E.S., Edgerton, M., & Aaconson, M. Classroom Behavior Inventory. Mimeographed, 1979.

Schlesinger, I.M. The grammar of sign language and the problem of language universals. In J. Mirton (Ed.), Biological and social factors in psycholinguistics. London: Logos Press, 1971.

Segall, M.E. Cardiac responsivity to auditory stimulation in premature infants. Nursing Research, 1972, 21(1), 15-19.

Seligman, M. Helplessness: On depression, development and death. San Francisco: W.H. Freeman, 1975.

Share, J.B. Developmental progress in Down's Syndrome. In R. Koch & F.F. de la Cruz (Eds.), Down's Syndrome (Mongolism). New York: Brunner/Mazel, 1975.

Sigel, I., & Gallas, H. Cognitive developmental assessment in children: Application of a cybernetic model. In M.N. Ozer (Ed.), A cybernetic approach to the assessment of children: Toward a more humane use of human beings. Boulder, Co: Westview Press, 1979.

Sigman, M., Kopp, C., Parmelee, A., & Jeffrey, W.E. Visual attention and neurological organization in neonates. Child Development, 1973, 44.

Sigman, M., & Parmelee, A. Visual attention in premature and full term infants. Child Development, 1974, 45.

Sigman, M., & Parmelee, A.H. Jr. Longitudinal evaluation of the preterm infant. In T.M. Field (Ed.), Infants Born At Risk. New York: SP Medical and Scientific Books, 1979.

Sinclair-de Zwart, H. Developmental psycholinguistics. In D. Elkind & J. Flavell, (Eds.), Studies in cognitive development. New York: Oxford University Press, 1969.

Siqueland, E.R. Conditioned sucking and visual reinforcers with human infants. Paper presented at Eastern Regional meeting, Society for Research in Child Development, Worcester, Mass., April 1968.

Siqueland, E.R., & DeLucia, C.A. Visual reinforcement of nonnutritive sucking in human infants. Science, 1969, 165, 1144-1146.

Snow, C. Mothers speech to children learning language. Child Development, 1972, 43, 549-565.

Snyder, L. Communicative and cognitive abilities and disabilities in the sensorimotor period. Merrill-Palmer Quarterly, 1980, 24, 161-180.

Sokolov, E.N. Perception and the conditioned reflex. S.W. Waydenfeld (Trans). New York: MacMillan, 1963.

Solnit, A.J., & Stark, M.H. Mourning and the birth of a defective child. Psychoanalytic Study of Children, 1961, 16, 523-537.

Spearman, C.E. The abilities of man. London: Macmillan, 1927.

Spelke, E.S., & Owaley, C.J. Intermodal exploration and knowledge in infancy. Infant Behavior and Development, 1979, 2, 13-27.

Spivack, G., Platt, J., & Shue, M. The problem solving approach to adjustment. Washington: Jossey-Bass Publishers, 1976.

Spradlin, J., & Rosenberg, S. Complexity of adult verbal behavior in a dyadic situation with retarded children. Journal of Abnormal and Social Psychology, 1964, 68, 694-698.

Spradlin, J.E., & Vanbiervliet, A. Transfer: Behaving effectively in new situations. In J. Hogg & P.J. Mittler (Eds.), Advances in mental handicap research: Vol. 1. London: John Wiley, 1980.

Sroufe, L.A. Socioemotional development. In J.D. Osofsky (Ed.), Handbook of Infant Development. New York: John Wiley & Sons, 1979.

Sroufe, L.A., & Waters, E. Attachment as an organizational construct. Child Development, 1977, 48, 1184-1199.

Sroufe, L.A., & Wunsch, J.P. The development of laughter in the first year of life. Child Development, 1972, 43, 1326-1344.

Stafford, P.B. The semiotics of old age in a small midwestern town: An interactionist approach. Unpublished dissertation, 1977.

Stephen, E., & Hawks, G. Cerebral palsy and mental subnormality. In A.M. Clarke & A.D.B. Clarke (Eds.), Mental deficiency: The changing outlook. New York: Free Press, 1975.

Stern, D. Mother and infant at play: The dyadic interaction involving facial, vocal, and gaze behaviors. In M. Lewis & L. Rosenblum (Eds.), The effect of the infant on its caregiver: The origins of behavior, Vol. 1. New York: Wiley, 1974.

Stewart, A.L., & Reynolds, E.O.R. Improved prognosis for infants of very low birth weight. Pediatrics, 1974, 54, 724-735.

Stone, L.J., Smith, H.T., & Murphy, L.B. The competent infant. New York: Basic Books, 1973.

Stott, L.H., & Ball, R.S. Infant and preschool mental tests: A review and evaluation. Monographs of the Society for Research in Child Development, 1965, 30(3, Serial No. 101).

Sugarman-Bell, S. Some organizational aspects of pre-verbal communication. In I. Markova (Ed.), Social context of language. New York: Wiley, 1978.

Sullivan, M.W. Personal communication, 1982.

Sullivan, M.W., Rovee-Collier, C.K., & Tynes, D.M. A conditioning analysis of infant long-term memory. Child Development, 1979, 50, 152-162.

Thelen, E. Rhythmical behavior in infancy. An ethological perspective. Developmental Psychology, 1981, 17, 237-257.

Thoman, E., Barnett, C., & Leiderman, H. Feeding behaviors of newborn infants as a function of parity of the mother. Child Development, 1971, 42, 110-118.

Thomas, A. Primary Reaction Patterns in Childhood. N.I.M.H. Progress Report, 1966.

Thomas, A., Chess, S., & Birch, H. The origin of personality. Scientific American, 1970, 223, 102-109.

Thomas, A., Chess, S., Birch, H., Hertzig, T., & Korn, S. Behavioral individuality in early childhood. New York: New York University Press, 1963.

Thurstone, L.L. Primary mental abilities. Psychometric Monographs, 1938, No. 1.

Tjossem, T.D. Intervention strategies with high risk infants. Baltimore, Md.: University Park Press, 1976.

Tomlinson-Keasey, C. Conditioning of infant vocalizations in the home environment. The Journal of Genetic Psychology, 1972, 120, 75-82.

Trevarthen, C., & Hebley, P. Secondary intersubjectivity: Confidence, confiding and acts of meaning in the first year. In A. Lock (Ed.), Action, Gesture and Symbol: The Emergence of Language. London: Academic Press, 1978.

Turkewitz, G., Moreau, T., Davis, L., & Birch, H. Factors affecting lateral differentiation in the human newborn. Journal of Experimental Child Psychology, 1969, 8, 483-493.

Ullmann, C.A. Identification of maladjusted school children. (Monograph No. 7) Washington D.C.: U. S. Public Health Service, 1952.

Uzgiris, I.C. Organization of sensorimotor intelligence. In M. Lewis (Ed.), Origins of intelligence: Infancy and early childhood. New York: Plenum, 1976.

Uzgiris, I., & Hunt, J. Assessment in infancy. Ordinal scales of psychological development. Chicago: University of Illinois Press, 1975.

Vaughn, B., Waters, E., Egeland, B., & Sroufe, L. Individual differences in infant mother attachment at twelve and eighteen months: Stability and change in families under stress. Child Development, 1978, 50, 971-975.

Vernon, M. Multiply handicapped deaf children: Medical, educational and psychological considerations. Research Monographs of the Council for Exceptional Children. Washington, D.C., 1969.

Vietze, P.M., Falsey, S., O'Connor, S., Sandler, H., Sherrod, K., & Altemeier, W.A. Newborn behavioral and interactional characteristics of nonorganic failure-to-thrive infants. In T. Field (Ed.), High risk infants and children: Adult and peer interactions. New York: Academic Press, 1980.

Vygotsky, V. Thought and Language. Cambridge, Mass.: M.I.T. Press, 1962.

Wahler, R.G. Infant social attachments: A reinforcement theory interpretation and investigation. Child Development, 1967, 38, 1097-1088.

Waite, L.H. Theoretical perspectives of social cognition during the first two years of life. Paper presented at the Seventh Annual Symposium of the Piaget Society, Philadelphia, Pennsylvania, May 1977.

Walker, J. Individualizing services to deaf-blind and other multiply handicapped children: State of the art, 1975. Austin, Texas: Texas Regional Resource Center - Texas Education Agency, 1975.

Waters, E. The reliability and stability of individual differences in mother-infant attachment. Child Development, 1978, 49, 483-494.

Waters, E., Wippman, J., & Sroufe, L. A. Attachment, positive affect, and competence in the peer group: Two studies in construct validation, Child Development, 1979, 50, 821-829.

Waters, E., & Sroufe, L.A. Ego-central and ego-resiliency at four years as related to early infant-mother attachment. Unpublished report, 1980.

Watson, J.S. The development and generalization of contingency awareness in early infancy: Some hypotheses. Merrill-Palmer Quarterly, 1966, 12, 123-135.

Watson, J.S. Memory and "contingency analysis" in infant learning. Merrill-Palmer Quarterly, 1967, 13, 55-76.

Watson, J.S. Operant conditioning of visual fixation in infants under visual and auditory reinforcement. Developmental Psychology, 1969, 1, 508-516.

Watson, J.S. Smiling, cooing, and the "The Game". Merrill-Palmer Quarterly, 1972, 18, 323-339.

Watson, J.S., & Ramey, C.T. Reactions to response-contingent stimulation in early infancy. Merrill-Palmer Quarterly, 1972, 18, 219-227.

Weiner, G., Rider, R.V., Opel, W.C., & Harper, P.A. Correlates of low birth weight: Psychological status at eight to ten years of age. Pediatric Research, 1968, 2, 110-118.

Weisberg, P. Operant procedures for the establishment of stimulus controlling two-year old infants. Journal of Experimental Child Psychology, 1969, 7, 81-95.

Wetherford, M., & Cohen, L. Developmental changes in infant visual preferences for novelty and familiarity. Child Development, 1973, 44, 416-424.

White, R.W. Motivation reconsidered: The concept of competence. Psychological Review, 1959, 66, 297-333.

Wiegerink, R., Harris, C., Simeonsson, R., & Pearson, M.E. Social stimulation of vocalizations in delayed infants: Familiar and novel agent. Child Development, 1974, 45, 866-872.

Wilson, R.S., Brown, A.M., & Mathew, A.P., Jr. Emergence and persistence of behavioral differences in twins. Child Development 1971, 42, 1381-1398.

Windle, W. Neuropathology of certain forms of mental retardation. Science, 1963, 140, 1186-1189.

Winick, M. Changes in nucleic and protein content of the human brain during growth. Pediatric Research, 1968, 2, 352.

Wishik, S. Georgia study of handicapped children. Georgia Department of Public Health, 1964.

Witelson, S.F. Anatomic asymmetry in the temporal lobes: Its documentation, phylogenesis, and relationship to functional asymmetry. In S.J. Dimond & D.A. Blyaid (Eds.), Evolution and lateralization of the brain. New York: Annals of New York Academy of Sciences, 1977.

Wolff, P.H. The development of manual asymmetries in motor sequencing skills. In S.J. Dimond & D.A. Blyaid (Eds.), Evolution and lateralization of the brain. New York: Annals of New York Academy of Sciences, 1977.

Wolff, P.H., & Hurwitz, I. The choreiform syndrome. Developmental Medicine and Child Neurology, 1966, 8, 160.

Yakovlev, P. & LeCours, A. Myelogenetic cycles of regional maturation of the brain. In A. Minkowski, (Ed.), Regional development of the brain in early life. Oxford: Blockwell, 1967.

Yoshida, R.K., Lewis, M., Schimpler, S., Ackerman, J.Z., Driscoll, J., & Koenigsberger, M.R. The distribution of attention within a group of infants "at risk". Research Bulletin 74-41. Princeton, N.J.: Educational Testing Service, 1974.

Zajonc, R.B. Feeling and thinking: Preferences need no inferences. American Psychological Association invited address, New York, September 1979.

Zarin-Ackerman, J., Lewis, M., & Driscoll, J. Language competence of two-year-old normal and high-risk infants. Paper presented at the Society for Research in Child Development meetings, Denver, April 1975. Also presented at the Society for Perinatal Research meeting, Denver, April 1975.

Zarin-Ackerman, J., Lewis, M., Driscoll, J. Patterns of visual fixation in the sick, premature infant: A longitudinal study of the first two years of life. Paper presented at the Society for Research in Child Development meetings, Denver, April 1975.

Zelazo, P.R. Smiling to social stimuli: Eliciting and conditioning effects. Developmental Psychology, 1971, 4, 32-42.

Zelazo, P.R. Smiling and vocalizing a cognitive emphasis. Merrill-Palmer Quarterly, 1972, 18, 349-365.

APPENDICES

OUTLINE

Appendix A

Measures

Identification Project

1. Neurological Exam
2. Neurodevelopmental Exam
3. Clements & Peters
4. Brich and Lefford Visual-Motor Integration Tasks
5. Chapman Verbal Comprehension Task
6. Neonate definitions
7. 3-month definitions
8. Parent Interview
9. Handbook for Families

IDENTIFICATION PROJECT

Section 1.

Neurological Examination

I. History

A. History of Pregnancy, Birth and Delivery, noting any abnormalities.

B. Developmental History including the age of appearance of the following: Social smile, Visual pursuit, Rolling from prone to supine, and Supine to prone, Sitting without support, Reaching for objects, Repetitive monosyllables, Single words, Phrases, Sentences, Pulling to a standing position, Walking, Toilet training.

C. History of Presenting Problem e.g., headache, learning problem, seizure, etc.

D. Pertinent Family History, e.g., Family history of delayed development, delayed speech, learning problem, mental retardation, seizures or epilepsy, muscle weakness or muscular dystrophy, drug or alcohol addiction.

II. General Physical Examination, including head circumference measurement, and skull transillumination in infants under one year of age.

III. Neurological Examination

A. Evaluation of the Motor System to include: Strength, muscle tone, tendon reflexes, fine and gross motor coordination, examination for the presence of adventitious movements, tremor, synkinesia, dystonic posturing on heel and toe walking, tandem gait, hopping on one foot, right or left dominance, etc.

B. Cranial Nerve Examination noting any abnormality of the function of the twelve cranial nerves such as abnormalities of vision, hearing, ocular movements, facial, buccal, lingual movements, facial sensation, etc.

C. Sensory Examination, including cortical sensory function in those old enough to test these functions.

D. Developmental Evaluation, i.e., tests of global function using age appropriate developmental tasks. The standards used for these assessments are provided on attached sheets.

Section 2

Neurodevelopmental Exam Newborn
Infant Development Project

by's Name ______________________ Initial State ______________________

.O.B ______________________ Predominant State ______________________

.A. ____________ D.O.E. ______________

INE MOTOR/SENSORY (4) SCORE

Visual Pursuit

1) Does not focus on or follow stimulus.
2) Stills with stimulus and brightens.
3) Stills, focuses on stimulus when presented, little spontaneous interest, no following.
4) Stills, focuses on stimulus, follows for 30 arc, jerky movements.
5) Focuses & follows with eyes horizontally fo at least a 30° arc. Smooth movement, loses stimulus but finds it again.
6) Follows for 30° arcs with eyes and head. Eye movements are smooth.
7) Follows with eyes and head at least 60° horizontally, maybe briefly vertically, partly continuous movement, loses stimulus occasionally, head turns to follow.
8) Follows with eyes and head 60° horizontally and 30° vertically.
9) Focuses on stimulus and follows with smooth continuous head movement horizontally, vertically, and in a circle. Follows for 120° arc.

uditory Response

1) No reaction.
2) Respiratory change on blink only.
3) General quieting as well as blink and respiratory changes.
4) Stills, brightens, no attempt to locate source.
5) Shifting of eyes to sound, as well as still and brightens.
6) Alerting and Shifting of eyes and head turn to source.
7) Alerting, head turns to stimulus, and searc with eyes.
8) Alerting prolonged, head and eyes turn to stimulus repeatedly.
9) Turning and alerting to stimulus presented on both sides on every presentation of stimulus.

ull-to-Sit

1) Head flops completely in pull to sit, no attempts to right it in sitting.
2) Futile attempts to right head but some shoulder tone increase is felt

Pull-to-Sit (cont.)

3) Slight increase in shoulder tone, seating brings head up once but not maintained, no further efforts to right it.
4) Shoulder & arm tone increase, seating brings head up, not maintained but there are further efforts to right it.
5) Head and shoulder tone increase as pulled to sit, brings head up once to midline by self as well, maintains it for 1-2 seconds.
6) Head brought up twice after seated, shoulder tone increase as comes to sit, and maintained for more than 2 seconds.
7) Shoulder tone increase but head not maintained until seated, then can keep it in position 10 seconds.
8) Excellent shoulder tone, head up while brought up but cannot maintain without falling, repeatedly rights it.

LANGUAGE (5,6)	**SCORE**	
Cry	0	absent/cannot be elicited
	+	high pitch/erratic
	++	present/normal
GROSS MOTOR (3,4)		
Grasp (traction)	0	absent
	+	present weak
	++	present normal
Large Muscle Tone Supine	0	absent
	+	hypotonia
	++	hypertonia
	+++	normal
Prone	0	absent
	+	hypotonia
	++	hypertonia
	+++	normal
Moro	0	absent
	+	poor(monophasic, weak)
	++	normal(biphasic, brisk)
Asymmetric TNR	0	absent
	++	obligatory
	+++	normal
Supporting Response (LE's)	0	absent
	+	hypotonic
	++	hypertonic
	+++	normal
Rooting	0	absent
	+	weak
	++	normal

Sucking	0	absent
	+	weak
	++	normal
Tendon Reflexes	0	absent
	+	weak
	++	hypertonic
	+++	normal
Posture in Supine	0	floppy
	+	asymmetric
	++	extended
	+++	flexed
Clonus	0	sustained 5 beats or more
	+	present 5 beats or less
	++	absent
Walking	0	absent
	+	inconsistent
	++	present-consistent
Final Impression		normal suspect(specify) abnormal(specify)

Score________________

INFANT DEVELOPMENT PROJECT

Neuro-Developmental Exam
1-2 Months

by's Name ______________________ Date ______________

OSS-MOTOR(3,4)

oting	0	absent
	+	inconsistent/weak
	++	present/normal
cking	0	absent
	+	inconsistent/weak
	++	present/normal
ro	0	absent
	+	monophasic
	++	bi-phasic
onus	0	present/sustained
	+	present 5 beats or less
	++	absent
acing(anterior)	0	absent
	+	inconsistent
	++	present & consistent
anding	0	absent
	+	inconsistent in support of weight scissoring
	++	consistent supports weight
lking	0	absent
	+	inconsistent
	++	present consistent
R	0	absent
	+	inconsistent
	++	present consistent
ntral Suspension	0	absent
	+	inconsistent
	++	present consistent
R	0	absent
	+	inconsistent
	++	present consistent

LL-TO-SIT

Head flops completely in pull to sit, no attempts to right it in sitting.
Futile attempts to right head but some shoulder tone increase is felt.
Slight increase in shoulder tone, seating brings head up once but not maintained, no further efforts.

PULL-TO-SIT (cont.)

4) Shoulder and arm tone increase, seating brings head up, not maintained but there are further efforts to right it.
5) Head and shoulder tone increase as pulled to sit, brings head up once to midline by self as well, maintains it for 1-2 seconds.
6) Head brought up twice after seated, shoulder tone increase as comes to sit, and maintained for more than 2 seconds.
7) Shoulder tone increase but head not maintained until seated, then can keep it in position 10 seconds.
8) Excellent shoulder tone, head up while brought up but cannot maintain without falling, repeatedly rights it.

FINE MOTOR/SENSORY (4)

Visual Pursuit	180° vertical-	0	absent
		+	present but inconsistent
		++	present and consistent
	180° horizontal-	0	absent
		+	present but inconsistent
		++	present and consistent
Auditory Competence (turns toward sound) (4,5)		0	absent
		+	inconsistent
		++	consistent
Smiling-In response to face &/or voice (4) (circle one or both)		0	absent
		+	inconsistent
		++	consistent
Early Release Traction Grasp		0	absent
		+	inconsistent
		++	present

LANGUAGE (5,6)

Early babbling: (may be responsive)	0	absent
	+	inconsistent
	++	present
Cry	0	absent
	+	high pitched/erratic
	++	present & normal

HISTORY

1. Sleep patter How often does child wake up?_________
What's longest sleep period?__________
What's longest wake period?___________

1) Regular through the night, wakes for feedin
2) Sleep pattern eratic
Specify__________________
____

2. Feeding 1) Breast___
2) Bottle___
3) How often_______
4) How much_______
5) Vitamins________

3. Height (length in cm)______________
4. Weight (in KG) ____________________
5. Head Circumference_________________

Infant Development Project ISEC

NEURO-DEVELOPMENTAL EXAM 3-4 MONTHS

Baby's Name ____________________ Date ________________ I.D.# __________

CATEGORY	SCORE
FINE MOTOR/SENSORY	
Visual Pursuit: (4)	180° vertical- 0 absent + present but inconsistent ++ present and consistent
	180° horizontal-0 absent + present but inconsistent ++ present and consistent
Auditory Competence (turns toward sound) (4,5)	0 absent + inconsistent ++ consistent
Smiling In response to face and/or voice (4) (circle one or both)	0 absent + inconsistent ++ consistent
Contact Grasp (In absence of traction response) (3 4 5)	0 absent + inconsistent ++ consistent
Early Instinctual Hand Response (stroking lateral border of hand, hand opens and may orient) (3 4.5)	0 absent + inconsistent ++ consistent
LANGUAGE	
Early babbling: (may be responsive) (report)	0 absent + inconsistent ++ consistent
MUSCLE TONE	
In prone (head elevation expected) (3.4) (suspension)	0 absent (inverted U) + partial (head extended) ++ present (head & legs extended
In supine (normal tone expected: random movement of voluntary quality. Scissoring of limbs, jerkiness of movement is considered abnormal) (3.4)	0 hypotonic + hypertonic ++ some jerkiness of movement +++ normal tone
Pull to sit (head & shoulder tone & control) (3.4.5)	0 no head control + partial success in maintainir upright 1-2 sec. ++ success in maintaining head 5-10 sec. +++ head brought up in vertical, some slight lag ++++ head brought in vertical

REFLEXES

Clonus·(3.4.5)	0 present & sustained + 7 beats or less ++ absent
Tendon reflexes-upper extremities·(3.4.5)	0 absent + asymmetrical ++ brisk +++ present (normal)
TNR·(3 4.5 6)	0 present/obligatory + inconsistent/non-obligatory ++ absent
Moro·(3.4.5.6)	0 present & biphasic + partial (one hand/extensor response) ++ absent
Lateral & medial placing:(3.4.5)	0 absent + present/inconsistent ++ present/lateral, not medial +++ present both lateral & medial
Standing (3.4.5)	0 scissoring/ not supporting weight + poor support, no scissoring ++ supports weight

SCORING

1) Score each item. One + is 1 point, 2.++ are 2 points, ect.
2) Total score for each child.
3) A zero(0) score on any item except early instinctual hand response and/or Tendon reflexes-Upper extremities, is very serious. Infants receiving such a score should be followed closely and referred for proper evaluation.
4) 3 month old infant's score 36 and above.
   4 month old infant's score 45 and above.
5) Each infant must be scored only in proper state. State #'s next to each item indicate the necessary state for evaluation of an item.

EXAM **SCORE**

Normal

Suspect(specify)

Abnormal(specify)

The neuro-developmental exams for older infants are currently being developed but will include at a-propriate age points items from the following categories:

Six to Eight Months

RESTING POSTURE AND MUSCLE TONE: Essentially voluntary; VISUAL PURSUIT: Voluntary with independent head and eye movements; REFLEX RESPONSES: Strong Pursuit and grasp, voluntary reaching for short distances, clumsy whole hand grasp in midline; transfers across midline at 7 months; SITTING indefinite in frog at 6 months, indefinite unsupported at 8 months, PRONE SUSPENSION: Outreach of UE's on approach of surface (umbrella response) by 6-8 months; LANGUAGE: Inflexive babbling.

Six to Seven Months. Reach and grasp-fisted, clumsy, one inch cube.
Seven to Eight Months. Combines, mouths, transfers cube.
Eight Months: Reach with thumb and three-finger grasp, brief regard of marble.
Nine Months. Reach with thumb and two-finger grasp.
Ten to Twelve Months: Pincer grasp (thumb and index finger), grasps marble.
Fifteen Months. Stacks 3-4 blocks.
Eighteen to Twenty-one Months. Stacks 5-6 blocks, places 3 marbles in container and caps.
Twenty-one to Twenty-four Months. Stacks 6-7 blocks, classical figures (circle, triangle, square); stacks on any form; scribbles with crayon.
Twenty-four Months. Names 2-3 Gesell pictures (dog, shoe, clock, flag, leaf, house, stars, cup, book, basket); draws circle.
Thirty Months. Names 5, identifies 7, places figures randomly on forms.
Thirty-six Months. Names 8, pictures, draws cross and circle, places figures appropriately on forms.

Section 3

Clements & Peters

The following items are from the Clements and Peters examination and will be modified when necessary for the children in our investigation. Items 1 and 2 have to do with motor stance persistence (Teicher 1941; Silver, 1952; Bender, 1956; Garfield, 1964). Child is told "Stand up, put your feet together and close your eyes. Now put your arms straight out in front of you --spread your fingers --do not touch your thumbs together." Some children hold their arms rigidly at their sides, or in other ways show that they do not comprehend "out in front." If a child does not understand instructions, they are repeated; if he fails again, examiner places his arms and hands in proper position.

Item 1 - places arms elsewhere.
Item 2 - arms drop or spread.

Items 3 to 8 have to do with stance during passive head rotation (Teicher, 1941; Silver, 1952; Bender, 1956; Garfield, 1964). Examiner says "This time I am going to put my hands on your head - don't help me - let me turn it and keep your arms straight out in front, fingers spread and eyes closed." Examiner slowly rotates child's head 90° in one direction, holds it for a few seconds, then rotates head 180° in opposite direction. This is repeated several times. Usually very light finger pressure is sufficient.

Item 3 - during passive head rotation, arms drop and spread.
Item 4 - elbows bend.
Item 5 - one arm drops.
Item 6 - irregular position of wrist, hand or fingers.
Item 7 - torso turn (1 to 3 +), or whole body turn (4 +).
Item 8 - resistance of head to passive rotation.

Item 9 is concerned with imitation of finger movement. Child is seated facing examiner and asked to copy finger movements made by examiner, using one hand at a time. Examiner extends both arms with fingers slightly raised and palms towards child, saying "Do exactly as I do." Child then imitates finger-thumb touching as done slowly by examiner, e.g. if examiner touches left thumb to left index finger, child executes the same maneuver using his right hand. Examiner switches about from hand to hand, slowly at first, then faster. If child copies movements of examiner's left hand with own left hand (a more sophisticated response), he is asked to copy on same side as the examiner. Examiner looks for quality of movement, speed of following, finger agnosia (especially of middle and ring fingers) and for associated movements in other hand.

Item 9 - imitation of finger involvement.
Item 10 - choreiform movements (Prechtl and Stemmer, 1962; Wolff & Hurwitz, 1966) of fingers, arms, head or trunk during Items 1 to 9.
Item 11 - athetoid movements during Item 1 to 9.
Item 12 - tremor of fingers during Items 1 to 9.
Item 13 - heel walk.
Item 14 - toe walk.
Item 15 - hop on one foot (8 feet), then the other.
Item 16 - stand on one foot to count of his age, then other foot.
Item 17 - skip
Item 18 - walk in tandem, a line or string.
Item 19 - speed of tapping one foot, then the other.
Item 20 - note presence of any associated movements during Items 13 to 19.
Item 21 - finger-nose test.
Item 22 - finger pursuit.

For Item 23 the examiner sits close to and facing child, with hands on knees, palms up, and says, "Watch me first. Look, I touch my thumb to each finger (little finger first) one, two, three, four (slowly) one, two, three, four. Now you do it. Now a little faster. Now the other hand." Examiner looks for inability to curl fingers, missed contacts, poor sequence, slowness, "stickiness" of release and reckless speed with inaccuracy. He also watches for symmetrical associated movements in fingers on the other hand and records them. Slight symmetrical, associated movements are normal up to about age 11 or 12 years.

Item 23 - fingers-thumb test.

For Item 24 the examiner places his hands on his knees, palms down, and demonstrates very slowly how to slap knees alternately with palms and backs of hands. Child is asked to do same, first with both hands and then with each hand separately. At first he is told to "go slow," then "faster," then "very fast." Child is scored for disorganization of sequence and slow, "sticky" turns, either of one hand or both. If a child uses edge of hand as pivot he is asked to life hands off leg between each turn.

Item 24 - alternating movements.

For Item 25, the child is shown how to tap curled index finger against distal joint of thumb and is told, "Do it as fast as you can." Younger children are naturally slower. Examiner looks for slow, clumsy execution. Associated movements of thumb, wrist, arm, jaw or foot are recorded.

Item 25 - finger tapping.

Section 4

Birch and Lefford Visual-Motor Integration Tasks

The visual recognition tasks, 12 in all, involve visual discrimination of a given tent form from among 12 other geometric forms.

Visual motor tasks involve drawing of triangles and diamonds under a variety of conditions of visual support. Four tasks demand free-hand drawing on blank paper from a visual model. Four call for drawing the same geometric figures on a sheet containing a dot grid. Another four require drawing the figures on a line grid and the four final tasks involve free-hand drawing of the figures from a model which emphasizes each angle by the presence of a dot.

The visual analysis tasks are simple embedded figures problems and require identification of isolated linear elements present in two whole figures -- a diamond and a triangle. Six tasks are given for each of two figures used. A line or segment equivalent to one present in the figure is presented on a stimulus card and the subjects will be asked to identify each element in the whole figure.

The visual synthesis tasks present the child with a multiple choice problem in which he must decide which of several simultaneously presented groups of horizontal or vertical lines can be rearranged to form construction of a geometric figure (presented on a stimulus card).

The dot connecting tasks are eight simple visual-motor tasks -- four involve drawing of lines connecting patterns of dots. These lines define four geometric figures used in the free-hand drawing from a visual model. The four final tasks require the subject to trace over a line drawing of each of four figures.

Section 5

Chapman Verbal Comprehension Task

Administration

All instances of unintention cuing of the child by the experimenter will be noted from the video tape and ruled out as test instances. Initially the scoring will be done from video tape. Instances in which the child was attending to the objects or already carrying out the requested action will also be ruled out. Each child will be credited with passing if at least one unambiguous instance of compliance with test criteria can be found in the entire video tape of the test session. "For example, if the child picked up and kissed the ball in response to Make the horsey kiss the ball, he will be given credit for comprehension of action-object but not agent-action-object. If he had been playing with the ball when given the command and then kissed it, he would be credited only with action verb (Chapman, 1979).

	VISUAL STIMULI	
VERBAL STIMULI (From Beckwith and Thompson, 1976)	LEFT SCREEN	RIGHT SCREEN
Cup..Show me (where's; point to) the cup.. Cup	Toy blocks	Cup
Key..Show me the key..key	Key	Doll
Shoe.. show me the shoe..shoe	Tennis shoe	Pair of eyeglasses
Airplane..show me the airplane.. airplane	Teddy bear	Toy airplane
Crackers..show me the crackers.. crackers	Toy boat	Crackers
Telephone..show me the telephone.. telephone	Telephone	Wristwatch
Kiss..who's kissing..which one is kissing..kiss	Child jumping	Child hugging & kissing another child
Eat..who's eating..show me eating.. eat	Child eating, holding a spoon & plate	Child climbing a pole
Smile..who's smiling..smile	A rock	Child smiling
Drink..who's drinking..drink	Child drinking, holding glass to lips	Child on swing
Hand..where's the hand..hand	Man's bare foot	Woman's hand
Orange..where's the orange..orange	An apple	An orange
Fork..show me the fork..fork	A metal fork	A metal knife
Flower..show me (where's) the flower.. flower	One leaf	One flower
Lady..show me (where's) the lady.. lady	Man	Woman
On..light on..where's the light on	Lamp lit	Lamp dark
Wet..which one's wet..wet	Boy standing	Boy wet, in water
Broken..show me broken..broken	Broken soda bottle	Not broken soda bottle
House..where's the house..house	Front of a house	One raw carrot
Bird. showme the bird..bird	Pigeon on ground	Metal pot
Scissors..show me the scissors.. scissors	Woman's face	Pair of metal scissors

Sitting..who's sitting..sitting	Woman sitting on chair	Woman standing by chair
Closed..eyes closed..whose eyes are closed..eyes closed	Boy's face with eyes open	Boy's face with eyes closed
In..in the box..dog in the box.. in	Toy dog next to a box	Toy dog in a box
Under..under the chair..ball under the chair..under	Chair with a ball under it	Chair with a ball on it
Tricycle..bike..show me the bike.. bicycle	Stroller	Tricycle
Lightbulb..show me the lightbulb.. lightbulb	Lightbulb	Stove
Bus..where's the bus..bus	Sideview of a bus	Side view of a truck
Up..up in the air..boy up in the air.. up	Man standing with a boy sitting on ground next to him	Man standing holding boy up in the air
On..hat on.. boy with a hat on..show me hat on	Boy wearing a hat on his head	Boy holding a hat in his hand
Not..not in the wagon..dog not in the wagon	Toy dog in a toy wagon	Toy dog next to the wagon
Tree..show me the tree..tree	A tree	Books
Bread..where's the bread..bread	A piece of white bread	Two socks
Cat..kitty..where's the kitty cat	A phonograph record	A cat

Comprehension Test Items

(adapted from Miller, Chapman, Branston, and Beichle, in press)

ITEM AND EXAMPLES

---

1. PERSON NAME
    Where's (child name)?
    Where's Mama?
    Where's (X)?

2. OBJECT NAME
    Where's (X)?
    Go get (X).
    Give me (X).
    X = words supplied by mother;
        shoe, hat, diaper, (stuffed animal) brought from home), ball, book, pencil, cup, bottle, table or chair

3. ABSENT PERSON OR OBJECT
    Item passed from #1 or #2

4. ACTION VERB
    (V) (it)
    Wanna (V) (it)?
    Can you (V) (it)?
    V = verbs supplied by mother;
        kiss, tickle, pat, hug, smell, blow, eat, throw, open, close, drink, and bang or hit

5. POSSESSOR-POSSESSION
    a. Where's mama's shoe?
        Where's Joshua's shoe?
    b. Where's Mama's chair?
        Where's Joshua's chair?
    Person and object names from those passed in #1 and #2.

6. ACTION-OBJECT
    Kiss the shoe.
    Can you hug the ball?
    Wanna pat the book?
    Verbs and objects are those passed in #2 and #4

7. AGENT (other than child)-ACTION
    Horsey eat.
    Make the doggie kiss.
    Wanna make the horsey eat?
    Verbs and objects are those passed in #2 and #4

8. AGENT (other than child)-ACTION-OBJECT
    Horsey kiss the ball.
    Can doggie eat the diaper?
    Verbs and objects are those passed in #2 and #4.

Section 5

Definitions for Neonate Mother-Infant Interaction

Infant Behaviors

1. Eyes closed - Infant's eyes are closed for the full ten seconds. Not a blink. This category is scored as an aid to the observer. If the infant's eyes are closed for three consecutive 10-second periods, the observation stops and the observer determines whether the infant is going to sleep. The observation continues only when the infant is awake. If the infant closes his/her eyes during feeding it is not necessary to stop observing unless the infant actually falls asleep.

2. Vocalization - Any voluntary sound or speech attempt on the part of the infant; includes babbling, grunting, gurgling or sighing; any effort to be vocally communicative. Does not include spitting or blowing bubbles. Does not include fretting or crying.

3. Extra Movement - A gross, attention-getting, vigorous movement, such as kicking, thrashing or arm waving. If the infant is in a jumper and moves around vigorously to make the jumper bounce, these movements are included. Does not include turning head, or normal hand and leg movements unless they are quite vigorous and attention-getting.

4. Fret/Cry - Obvious fretting or crying.

5. Feed--Bottle - Infant is being fed with a bottle, may or may not be held.

6. Feed--Breast - Infant is being nursed.

7. Visual Activity--Search - Infant fixes gaze on object or person other than mother; or, infant searches for sources of sound other than mother's vocalization, i.e. another person, talking or loud noise, radio, television, etc. Includes head turning in effort. May or may not focus or fix gaze on source, but search is coded as visual activity.

8. Smile/laugh - Any smiling or laughing on the part of the infant.

9. Burp, Sneeze, Cough - Includes choking, spitting up, mouthing and hiccupping as well as burping, sneezing coughing.

10. Looking at Mother - If the mother is close to the infant, i.e., holding him/her or has her head or face near to the infant, looking is scored only if the infant is looking at the mother's face. If the mother is far from the infant, i.e., across the room, etc., any looking at the mother on the part of the infant is scored. This category is not scored if the mother's body merely intrudes into the infant's visual field; infant must be actively looking at the mother with interest.

11. Sucking--Non-feed - Infant is rythmically sucking thumb, fist, pacifier, toy or blanket.

Mother Behaviors

1. Touch - Distinct and discrete touching on the part of the mother. Includes patting while burping. Does not include touching while changing or bathing unless touches are distinct from the processes of caretaking and are deliberate on the part of the mother.

2. Hold-Proximally Mother is holding the infant in her arms or over her shoulder. Infant's entire body is being supported by the mother. Does not include support given during changing or bathing, unless holding or picking up is distinct from the caretaking process. Support given during caretaking should be scored as change/bathe.

3. Hold - distally--Mother is holding/supporting infant on lap, not necessarily using hands. Also includes holding infant in vertical position, but at arms length.

4. Vocalization - Any vocal sounds directed toward the infant. Includes singing if directed toward the infant.

5. Vocalization to other - Any vocal sounds directed toward someone other than the infant. Includes vocalizations on the telephone, directed toward the observer, the television or pets.

6. Look - Discrete looks at the infant. Does not include looking while changing or bathing.

7. Smile/Laugh - Any smiling or laughing that is directed toward the infant.

8. Play w/s - Active play with infant. Includes tickling, bouncing, blowing air, etc., as well as play using a toy or other object.

9. Change diaper/Bathe - Mother is changing clothes, diaper, etc., bathing infant or washing his/her hands, face, etc. Touching and supporting which is part of changing and bathing should not be scored separately when this category is score.

10. Feed - Mother is feeding or attempting to feed the infant. Includes breast feeding and feeding with a bottle or spoon. If the infant is being held, "holding" should be scored as well.

11. Rocks S - Mother is rythmically rocking infant in arms, cradle, ets. If she is holding and rocking the infant, "holding" should also be scored.

12. Kiss - Mother kisses infant.

13. Stimulate to suck - Mother initiates feeding by rubbing/stroking her fingers or nipple in or near infant's mouth; she may rotate or jiggle nipple in infant's mouth; she may use alrger movements like jiggling or shaking infant's body or head when inserting nipple or during active feeding. Infant may be in sleep state or awake.

Infant's States:

SLEEP STATES

1) Deep sleep with regular breathing, eyes closed, no spontaneous activity except startles or jerky movements at quite regular intervals; external stimuli produce startles with some delay; suppresion of startles is rapid, and state changes are less likely than from other states. No eye movements.

2) Light sleep with eyes closed; rapid eye movements can be observed under closed lids; low activity level, with random movements and startles or startle equivalents; movements are likely to be smoother and more monitored than in state 1; responds to internal and external stimuli with startle equivalents, often with a resulting change of state. Repsirations are irregular, sucking movements occur off and on.

AWAKE STATES

3) Drowsy or semi-dozing; eyes may be open or closed, eyelids fluttering; activity level variable, with interspersed, mild startles from time to time; reactive to sensory stimuli, but response often delayed; state change after stimulation frequently noted. Movements are usually smooth.

4) Alert, with bright look; seems to focus attention on source of stimulation, such as an object to be sucked, or a visual or auditory stimulus; impinging stimuli may break through, but with some delay in response. Motor activity is at a minimum.

5) Eyes open; considerable motor activity, with thrusting movements of the extremities, and even a few spontaneous startles; reactive to external stimulation with increase in startles or motor activity, but discrete reactions difficult to distinguish because of general high activity level.

6) Crying; characterized by intense crying which is difficult to break through with stimulation.

Section 6

Dictionary of Behaviors

Infant Behaviors

1. Eyes closed - Infant's eyes are closed for the full ten seconds. Not a blink. This category is scored as an aid to the observer. If the infant's eyes are closed for three consecutive 10-second periods, the observation stops and the observer determines whether the infant is going to sleep. The observation continues only when the infant is awake. If the infant closes his/her eyes during feeding it is not necessary to stop observing unless the infant actually falls asleep.

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3. Extra Movement - A gross, attention-getting, vigorous movement, such as kicking, thrashing or arm waving. If the infant is in a jumper and moves around vigorously to make the jumper bounce, these movements are included. Does not include turning head, or normal hand and leg movements unless they are quite vigorous and attention-getting.

4. Fret/Cry - Obvious fretting or crying.

5. Feed--Bottle - Infant is being fed with a bottle, or is being nursed.

6. Feed--Spoon - Infant is being fed by spoon.

7. Play--Object - Infant is playing with a toy or manipulating the side of the crib, playpen, etc. Includes fingering blanket or clothing if the infant is attending actively to it.

8. Play--Person - Infant is playing with mother or other person including siblings. Includes only active interaction on the part of the infant. Includes infant playing with mother's (or other's) body or clothing. Does not require a response from the mother or other person with whom the infant is attempting to interact. If the mother or other person is playing with the infant with a toy, "play--object" should also be marked.

9. Play--Self - Infant is touching self or clothing, blowing bubbles, playing with hands or feet. This is an active exploration on the part of the infant.

Note: All playing categories require active manipulation on the part of the infant. Idle gestures, fingering, sucking fingers or pacifier and other activities which are not actively attended to by the infant are not included.

10. Smile/laugh - Any smiling or laughing on the part of the infant.

11. Burp, Sneeze, Cough - Includes choking, spitting up, mouthing and hiccupping as well as burping, sneezing and coughing.

12. Looking at Mother - If the mother is close to the infant, i.e., holding him/her or has her head or face near to the infant, looking is scored only if the infant is looking at the mother's face. If the mother is far from the infant, i.e., across the room, etc., any looking at the mother on the part of the infant is scored. This category is not scored if the mother's body merely intrudes into the infant's visual field; infant must be actively looking at the mother with interest.

13. Sucking--Non-feed - Infant is rythmically sucking thumb, fist, pacifier, toy or blanket.

Mother Behaviors

1. Touch - Distinct and discrete touching on the part of the mother. Includes patting while burping. Does not include touching while changing or bathing unless touches are distinct from the processes of caretaking and are deliberate on the part of the mother.

2. Hold - Mother is holding the infant in her arms, on her lap or over her shoulder. Infant's entire body is being supported by the mother. Does not include support given during changing or bathing, unless holding or picking up is distinct from the caretaking process. Support given during caretaking should be scored as change/bathe.

3. Vocalization - Any vocal sounds directed toward the infant. Includes singing if directed toward the infant.

4. Vocalization to other - Any vocal sounds directed toward someone other than the infant. Includes vocalizations on the telephone, directed toward the observer, the television or pets.

5. Look - Discrete looks at the infant. Does not include looking while changing or bathing.

6. Smile/Laugh - Any smiling or laughing that is directed toward the infant.

7. Play w/ S - Active play with infant. Includes tickling, bouncing, blowing air, etc., as well as play using a toy or other object.

8. Change diaper/Bathe - Mother is changing clothes, diaper, etc., bathing infant or washing his/her hands, face, etc. Touching and supporting which is part of changing and bathing should not be scored separately when this category is scored.

9. Feed - Mother is feeding or attempting to feed the infant. Includes breast feeding and feeding with a bottle or spoon. If the infant is being held, "holding" should be scored as well.

10. Rocks S - Mother is rythmically rocking infant in arms, cradle, etc. If she is holding and rocking the infant, "holding" should also be scored.

11. Read/TV - Mother is reading or attending to television. Should not be scored if television is merely turned on. Mother must be actively engaged in watching.

12. Kiss - Mother kisses infant.

13. Give Toy/Pacifier - Mother gives infant a toy or pacifier. If mother gives a toy, "Play w/ S" should be scored only if the mother is actively playing with the infant, not just handing her or him the toy.

Section 7

Parent Interviews

CASE #____________________ Date of Interview:____________

Mother's Name______________________ Hospital #______________

Child's Name______________________ Hospital #______________

Child's DOB______________________ Sex: M_______ F_______

Mother's Marital Status: 1=Single___ 2=Separated___ 3=Divorced___
4=Widowed___ 5=Married___ 6=Common-law marriage___

Were you pleased with the sex of your child? 1=Yes___ 2=No___
3=Neutral___

1. Was your child full-term? 1=Yes___ 2=No___

2. (If premature) How many weeks was the baby early? __________

3. How much did your child weigh at birth? ______g

4. Do you have any other children? 1=Yes___ 2=No___

(List name, age and sex of each)

	Name	Age	Sex
1.			
2.			
3.			
4.			
5.			

. (If 'yes' to #4, ask #5,6,8)

5. Did any of your other children weigh under 2500g? 1=Yes___ 2=No___

6. (If "yes" to #5) Has this child developed normally? 1=Yes___ 2=No___

7. (If "no", ask) What has been the problem? ________________________

____

8. Were any of your other children born with a particular medical or health problem? 1=Yes___ 2=No___

9. (If "yes" to #8, ask) Specify problem:

____

____

10. Did any of your pregnancies end in death shortly after delivery?
1=Yes___ 2=No___

a). Have you ever had an abortion?

1=Yes____ 2=No_____

b) (If "yes", ask:) How many?______

c) (If "yes", ask:) What type(s) of abortion(s) were they?

1=Spontaneous___ 2=Self-induced___ 3=Medical___

d) (If a medical abortion, ask:) Did you have the abortion because of personal reasons or medical ones? (i.e. doctor's recommendation)

1=Personal reasons___ 2=Medical reasons___

11. Have you had a problem of infertility in the past?

1=Yes___ 2=No___

12. (If "yes") How long did this period of infertility last?

1=Less than two years___ 2=More than two years___

13. Have you ever had a miscarriage?

1=Yes___ 2=No___

14. (If "yes") How many? ___________

15. Have you ever had a strong or unusual fear of giving birth to a congenitally deformed or defective child? 1=Yes___ 2=No___

6. (If "yes", ask) Why?
1=Medical history of birth defects in family
2=Guilt, superstition (i.e. form of punishment, etc.)
3=Don't know
4=Other reason

17. Has anyone in your immediate family given birth to a premature baby?
1=Yes___ 2=No___

18. (If "yes") DId this baby(s) survive and develop normally? 1=Yes___ 2=No_

19. Did you want to have this baby when you first found out you were pregnant? 1=Yes___ 2=Mixed feelings___ 3=Neutral___ 4=No___

0. (If answer is 2 or 4, ask) Why? ______________________________

____

21. (If answer to #19 is 2,3 or 4, ask) Did you want to have the baby as the time for delivery came close?
1=Yes___ 2=Mixed feelings___ 3=Neutral___ 4=No___

22. Did your husband want to have this baby when he first found out you were pregnant? 1=Yes___ 2=Mixed feelings___ 3=Neutral___ 4=No___
5=Don't know___

23. (If 2 or 4, ask) Why? ______________________________

____

24. (If answer is 2, 3 or 4, probe) Did your husband want you to have this baby as the time for delivery came close? 1=Yes___ 2=Mixed feelings___ 3=Neutral___ 4=No___ 5=Don't know___

25. While you were pregnant did you go regularly to a hospital for prenatal care?

1=Yes______ 2=No_____ 3=Sometimes____

26. While you were pregnant did you follow a strict diet or watched what you ate in an effort to provide proper nutrition for yourself and your child?

1=Yes__ 2=No____ 3=Sometimes____

27. Can you recall the occurrence of any particular or unusual emotional change in you while you were pregnant? (i.e. depression, elation, confusion, doubts or fear, nervousness, hostility, etc.)

1=Yes____ 2=No_____

28. (If 'yes', probe:) Describe your state of being at this time. What do you feel was responsible for your feeling this way?________________

____

____

____

29. Was anyone from your family present in the hospital while you were giving birth?

1=Yes____ 2=No_____

30. (If 'yes', ask:) Whom?______________________________

31. (Ask all mothers:) What do you feel is the main cause of a premature birth? ____

____

32. (If baby was premature, ask) What do you feel was the main factor causing the premature birth of your baby?

a=medical complications - (i.e. contraction of infection or illness by mother, high blood pressure, etc.) ___
b=Genetic factors ___
c=Excessive smoking, drinking or drug use during pregnancy ___
d=Severe injury or accident during pregnancy ___
e=Contraction of sexually transmitted disease prior to or during pregnancy ___
f=Malnutrition or lack of prenatal care ___
g=Emotional trauma during pregnancy ___
h=Does not know ___
i=Superstition (i.e. punishment from God) ___
j=Other ___

33. Do you feel that the premature birth of your baby is due to circumstances totally beyond your control, or do you feel in someway responsible? 1=Yes, feels responsible___ 2=No, does not feel responsible ___

34. (If "yes", probe) Why? ____

____

Ask all mothers the following questions:

35. Does your baby's physical appearance correspond to your expectations of what a baby should look like? 1=Yes___ 2=Somewhat___ 3=No___

36. Do you find your baby to be physically attractive and appealing? 1=Very attractive___ 2=Somewhat attractive___ 3=Somewhat unattractive___ 4=Very unattractive___

37. What is the one most attractive feature of your baby? ________________

____

38. What has been the least appealing obsevation that you have made about your baby? ____

____

NPI:

While it is not possible to know for certain what your baby will be like, you probably have some ideas and expectations. First, I want you to check the blanks which best describe the following behaviors of an average baby. Then I want you to check the blanks that you think best describes what your baby will be like.

39.

NEONATAL PERCEPTION INVENTORY I*

YOUR BABY

How much crying do you think your baby will do?

___ a great deal ___ a good bit ___ moderate amount ___ very little ___ none

How much trouble do you think your baby will have feeding?

___ a great deal ___ a good bit ___ moderate amount ___ very little ___ none

How much spitting up or vomiting do you think your baby will do?

___ a great deal ___ a good bit ___ moderate amount ___ very little ___ none

How much difficulty do you think your baby will have sleeping?

___ a great deal ___ a good bit ___ moderate amount ___ very little ___ none

How much difficulty do you expect your baby to have with bowel movements?

___ a great deal ___ a good bit ___ moderate amount ___ very little ___ none

How much trouble do you think that your baby will have settling down to a predictable pattern of eating and sleeping?

___ a great deal ___ a good bit ___ moderate amount ___ very little ___ none

40.

NEONATAL PERCEPTION INVENTORY I*

AVERAGE BABY

How much crying do you think the average baby does?

___ a great deal	___ a good bit	___ moderate amount	___ very little	___ none

How much trouble do you think the average baby has in feeding?

___ a great deal	___ a good bit	___ moderate amount	___ very little	___ none

How much spitting up or vomiting do you think the average baby does?

___ a great deal	___ a good bit	___ moderate amount	___ very little	___ none

How much difficulty do you think the average baby has in sleeping?

___ a great deal	___ a good bit	___ moderate amount	___ very little	___ none

How much difficulty does the average baby have with bowel movements?

___ a great deal	___ a good bit	___ moderate amount	___ very little	___ none

How much trouble do you think the average baby has in settling down to a predictable pattern of eating and sleeping?

___ a great deal	___ a good bit	___ moderate amount	___ very little	___ none

---

*Ibid., p. 442.

Doctor - Patient Communication

41. Are you a private or non-private patient? 1=Private___ 2=Non-private___

42. Who delivered your baby?
    a) private doctor ___
    b) doctor assigned by hospital ___
    c) midwife ___

43. What specifically did your doctor tell you about your baby's condition immediately after birth? ______________________________

____

44. How did your doctor rate your baby's health the first few days after your giving birth? 1=Very healthy and normal___ 2=Somewhat healthy and normal___ 3=Somewhat unhealthy and not normal___ 4=Very unhealthy and abnormal

45. How would you describe your doctor's first statement regarding the prognosis of your baby? 1=Very optimistic___ 2=Somewhat optimistic___ 3=Somewhat pessimistic___ 4=Very pessimistic___

46. With what frequency during your stay did your doctor approach you to see how you and your baby were faring, to inform you about the baby's progress or, to ask if you had any questions?
    a) several times a day___
    b) daily___
    c) less than daily___

47. Did your doctor request to speak to you and your husband together regarding the baby's progress? 1=Yes___ 2=No___

(If "yes") How many times? ______________________

48. Did your husband, out of his own initiative, attempt to get in contact with your doctor or request to see him? 1=Yes___ 2=No___

49. Do you feel that your doctor provided you with enough information about your baby and his progress while in the hospital?

1=Yes, more than enough 2=Yes, enough 3=Somewhat, sort of
4=No, not enough

50. (If 3 or 4, ask:) Did you try to seek this information through other means?

1=Yes 2=No

51. (If "yes", ask:) How? From whom? ____________________

____

52. Now I would like you to rate your doctor on the following points.

Quality	Excellent	V. good	Good	Average, Fair	Poor	6 V. Poor
1 able to give thorough and clear explanations						
2 trustworthiness of explanations						
3 availability to patients						
4 patience						
5 empathy						
6 ability to make one feel at ease and inspire confidence						
7 efficiency						
8 genuine interest in your and your baby's welfare and progress						

53. Now I would like for you to rate the nurses in the nursery on the same qualities.

Quality	Excellent	V. good	Good	Average Fair	Poor	V. Poor
1 able to give thorough and clear explanations						
2 trustworthiness of explanations						
3 availability to patients						
4 patience						
5 empathy						
6 ability to make one feel at ease and inspire confidence						
7 efficiency						
8 genuine interest in your and your baby's welfare and progress						

54. Did you feel that the nurses in the nursery welcomed your presence in the nursery and your questions about your baby? 1=Very welcomed___ 2=Somewhat welcomed___ 3=Somewhat unwelcomed___ 4=Very unwelcomed___

55. Was the contact and/or time allowed with your baby adequate? 1=Very adequate___ 2=Somewhat adequate___ 3=Somewhat inadequate___ 4=Very inadequate___

56. If you could make a change or improvement in the rules, regulations and/or procedures of the nursery, what would it be? ________________

57. In general, how satisfied are you with the medical services you and your child have receivee at Roosevelt Hospital? 1=Very satisfied___ 2=Somewhat satisfied___ 3=Somewhat unsatisfied___ 4=Very unsatisfied___

58. What impressed you most about the quality of medical services at Roosevelt Hospital? ________________

59. What was your main criticism if any, of the quality of medical services at Roosevelt Hospital? ________________

60. What most impressed you about your doctor? ________________

61. How could your doctors have been more helpful? ________________

62. What most impressed you about the nurses in the nursery? ____________

____

63. How could the nurses have been more helpful? ______________________

____

64. Have you attempted to investigate or gather any information about a particular area of infant care? 1=Yes___ 2=No___

65. (If "yes") What kind of information have you sought? ______________

____

66. (If "yes" to #65) From whom have you sought this information?
  a) medical staff___
  b) individual research (i.e. reading)____
  c) close relative or friend ___
  d) agency or institution _____
  e) other mothers in hospital _____

Mother's Physical and Emotional Well-being After Delivery

67. Did you name the baby? 1=Yes___ 2=No___

68.(If "yes") How long did it take you? ______________________

69.(If "no") Why have you not named the baby? 1=Indecisive about name___
2=Does not want to until the baby's chances for survival
are certain___

70. Have you notified your family and friends (closest ones to you) about the birth of your baby?

1=Yes 2=No

71. Did you have any particular worry or fear when you were brought to the hospital? What was it? ______________________

____

72. How did you feel right after delivery? ______________________

73. Did you have any particular worry? ______________________

74. What do you recall as being the worst time in the hospital? ______________________

____

75. (Ask of mothers with premature babies) When were you told that your baby would definitely survive? ______________________

76. How did you feel? ______________________

77. When was the first time you saw your baby? ______________________

78. How did you feel? ______________________

____

79. When was the first time you touched your baby? ______________________

80. How did you feel? ______________________

____

81. Do you feel that separation from your baby has been a problem?
1=No problem___ 2=Mild problem___ 3=Moderate problem___ 4=Big problem___

82. Do you feel as if the baby is yours? 1=Yes___ 2=No___ 3=Somewhat___

83.(If 2 or 3 Explain) ______________________

____

84. Do you feel close to the baby? 1=Yes___ 2=No___ 3=Somewhat___

85.(If 2 or 3 Explain) ______________________

____

86. (If answer to question 85 is "yes", ask) When did you start to feel close to the baby? ______________________________

____

87. Do you consider your baby cuddly? 1=Yes___ 2=Somewhat___ 3=No___

88. Now I want you to tell me to what extent have the following been a problem to you after giving birth:

Scale:
1=Never a problem
2=A mild problem
3=A moderate problem
4=A big problem

Items:		
1. Feelings of sadness		
2. Loss of appetite		
3. Inability to sleep		
4. Increased irritability		
5. Preoccupation thinking about baby		
6. Guilt		
7. Feelings of anger		

89. Now I want you to answer the following questions by answering "yes" or "no"

In the past few days, have you:	Yes	No
a) had episodes of crying		
b) prayed for the baby		
c) been depressed		
d) thought baby might die		
e) had moments of disbelief		
f) wanted to be alone		

90. Have you found yourself having unusual thoughts or doing unusual things? What are they? ______________________________

____

91. Do you feel that your husband has been adequately supportive?
1=Yes___ 2=Somewhat___ 3=No___

92. (If 2 or 3, probe) How has he not been sufficiently supportive?

____

93. Have you and your husband shared your feelings together about your baby? (Probe) 1=Yes___ 2=No___

94. Have you noticed a change in your husband after the baby was born? 1=Yes___ 2=No___

95. (If "yes") What change? ____

____

96. Have your relatives and friends come regularly to see the baby? 1=Yes___ 2=No___

97. Have you noticed any change in them? 1=Yes___ 2=No___

98. (If "yes") What change? ____

____

HANDBOOK FOR FAMILIES IN THE
INFANT DEVELOPMENT PROJECT
INSTITUTE FOR THE STUDY OF EXCEPTIONAL CHILDREN
PEDIATRIC SERVICE
THE ROOSEVELT HOSPITAL

The Institute for the Study of Exceptional Children (ISEC) is a collaborative effort of the Educational Testing Service, Princeton, NJ and the Pediatric Service, The Roosevelt Hospital. The Institute is directed by Dr. Michael Lewis, Infant Lab, Educational Testing Service. Dr. Louis Z. Cooper is director of the Pediatric Service at Roosevelt. The Infant Development Project is a part of ISEC. Its aim is to develop methods of early identification of risk in a population of infants.

This booklet will familiarize you with a few of the tests and measures we will be using in the Infant Development Project. We hope that you will cooperate with us in this effort to further our understanding of how premature and sick infants develop and how to care for them more effectively by allowing us to include you and your child in this study.

YOUR BABY
Why was my baby born early?

Approximately 1 out of 20 babies born at Roosevelt Hospital each year is 'premature. Pregnancy, from conception to delivery, usually takes about 40 weeks (9 months). A baby, who is born before the 37th week, is called premature." Sometimes the doctor knows why the baby was born early, but many times the reason is unknown. Certain conditions within the uterus may cause early delivery. The placenta, or afterbirth, through which nourishment passes to the baby, may be improperly placed within the uterus. Sometimes the membranes, or bag or waters, ruptures too soon. Most often, however, the mother's pregnancy seems to be progressing well, but for some unknown reason labor begins early and the baby is born prematurely.

THE PREMATURE BABY

By the time a mother is 3 months pregnant. her baby has developed all his internal organs and systems. He has all his "parts" his fingers, toes. heart lungs, brain, sex organs, etc. By the end of the ninth month of pregnancy, when the baby is expected to be born. certain organs. such as the lungs. stomach and kidneys are mature and ready to function. When a baby is born "prematurely," his body must do jobs before it had planned to and. therefore, may not do them very well at first. However. premature babies see and hear and experience their surroundings. We are interested in examining the baby's ability to attend to its environment and the effect of the hospital environment on the infant's development.

THE SMALL FOR DATES BABY

If a baby is born at full term," about 40 weeks after conception, but weighs less than we would expect for his age, we call this baby "small for dates." Before the baby is born, nourishment gets from the mother to her baby through the placenta (afterbirth). It is the placenta which separates the mother's blood and the baby's blood so that they do not mix. Sometimes

---

the placenta is small or does not work well. The baby gets enough nourishment to develop but not enough to grow as big as he should. These babies need as much attention as premature infants and it is important that we follow their progress closely.

THE INSTITUTE FOR THE STUDY OF EXCEPTIONAL CHILDREN

Our primary concern at Roosevelt Hospital is to provide the special care and observation that your baby needs at this time. We are also dedicated to improving our care of the babies by increasing our knowledge of their development. For this purpose, the Institute for the Study of Exceptional Children has established a research study at Roosevelt Hospital in which the development of full-term. sick and premature infants will be assessed. We will investigate such areas as hearing, vision, speech and intelligence throughout a period of three years. The tests and measures developed by our doctors and psychologists have been carefully planned and involve no induction of pain or risks of any kind to your baby.

SOME RESPONSES OF NEWBORNS TO THEIR ENVIRONMENT

From the moment of birth, your baby notices his new surroundings and begins to react to them. There are doctors and psychologists at the Institute who are studying how babies react to their environment and how these early experiences affect their behavior during early life. Since you. the mother, are a very important

part of the baby's experiences, we would like to watch you and your baby during a feeding session once you begin to feed him yourself.

Another way in which we can learn more about the responses of newborns to their surroundings is by asking mothers to share with us their own perceptions of their baby's early experiences and behavior. As part of the study, a member of our staff would like to interview you periodically to find out your observations on your baby's growth and development during his first years of life.

We are also particularly concerned with the development of motor coordination, vision, hearing speech and intelligence in infants. Development in these areas goes along with growth of the brain, which takes place at a very rapid rate in the newborn infant. Research has shown that some difficulties in these areas which show up later might be handled more effectively if we could detect them earlier. We are therefore studying the behavior of premature and full-term, sick and healthy newborns to help us understand normal development and the ways in which we may detect early signs of potentially serious problems.

SOME OF THE WAYS WE WILL ASSESS YOUR BABY'S PROGRESS

Attention

You may have noticed three discs or electrodes that are taped to your baby's skin. These electrodes are used to record heartrate. By attaching the electrodes to a polygraph and playing different recordings, we can see whether or not the baby is paying attention to certain changes in sounds. This is possible by monitoring the deceleration (slowing down) and acceleration (speeding up) of the baby's heart rate as he listens to the recordings.

Many researchers have observed these changes in full-term babies but very little is known about premature babies; therefore, we are interested in finding out how it is that premature babies pay attention. If your baby is included in our research study on infant development, this test, called "auditory habituation," would be one of the measures used.

Brazelton Exam

The Brazelton Behavioral Assessment scale was developed by a pediatrician at Children's Hospital in Boston to assess the interactive and neurological capabilities of a newborn baby. The scale contains 27 items which examine how well your baby orients to different visual or auditory stimuli. It also gives us a look into the interactive ability of the baby--how he or she can respond to you and other persons in the infant's world.

CONSENT FOR THE STUDY

We have just described to you some of the ways in which we are trying to find out more about growth and development in newborn infants. If you wish your baby to be included in our infant research study, you will need to sign a special consent form. One of our staff members will discuss with you in detail the different tests and measures included in the study, and will be happy to answer any other questions you might have.

You might be asking yourself at this point what personal value this study might have for you and your baby. Aside from helping us improve the care of babies like yours by increasing our knowledge of infant development, our periodic psychological evaluations will provide you with a more complete picture of your baby's development and progress. To help you and your baby visit our clinics for assessment we will provide money for transportation. We hope you will participate in this endeavor with us and look forward to you and your baby in the coming months.

FOLLOW-UP CARE

After your baby goes home, it is important for him or her to have regular medical check-ups. You may wish to take your baby to your own private pediatrician or you may decide to continue his care at the hospital's Special Newborn Clinic. In either case you are eligible to participate in the Institute's study. If you

do not wish to participate in the Infant Development Study you and your baby will still be eligible for free comprehensive medical care. If you do participate in the study and do want to use the clinic you and your baby will be in Special Newborn Clinic for babies in the Infant Development Project. At that clinic, only a small number of babies will be seen, making it possible for your baby to receive very personalized medical care and attention. If you decide to have your baby seen at the Project's Special Newborn Clinic, an appointment will be given to you when your baby is discharged from the hospital.

This booklet has been published by the Institute for the Study of Exceptional Children in an effort to help you understand the special needs of your baby at this time and how we care for your baby.

Dr. Nathan Fox, Director, Infant Development Project

Dr. Rita Fischer, Medical Coordinator, Infant Development Project

Wendy Ehrenkranz, Research Assistant

Agatha Jarvis, Research Assistant

Dulce Urena, Research Coordinator

Appendix B

COMPETENCY ASSESSMENT PROJECT

Sample Feedback

BAYLEY SCALES OF INFANT DEVELOPMENT

MENTAL SCALE RECORD FORM

NAME 469 AGE 28 mo SEX F

	Year	Month	Day
Date Tested	77	4	22
Date of Birth	74	12	5
Age			

	Raw Score	Development Index*	
Mental Scale	129	59	(MDI)
Motor Scale			(PDI)

* The standard score for the Mental Scale is called the MDI (for Mental Development Index); for the Motor Scale it is the PDI (for Psychomotor Development Index). See Manual for discussion.

NOTES:

Note.—If both the MENTAL SCALE and the MOTOR SCALE are administered to the child, the information below need only be filled in on the Record Form for the MENTAL SCALE.

ADDRESS

BIRTHPLACE

BIRTH WEIGHT BIRTH ORDER

PRENATAL OR BIRTH DIFFICULTIES

CHILD'S HEALTH

PARENT'S NAME

FATHER: EDUCATION OCCUPATION

MOTHER: EDUCATION OCCUPATION

HOUSEHOLD COMPOSITION

			Siblings								Other Children		
	Father	Mother	1	2	3	4	5	6	7	8	1	2	3
Check if Present in Household													
Approximate Age													
Sex (M for Male, F for Female)													

Comments:

PLACE OF TESTING Infant Lab

TESTED BY

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69-101AS

To score: Check P (Pass) or F (Fail). If "Other," mark O (Omit), R (Refused), or RPT (Reported by mother).

Item No.	Age Placement and Range (Months)	Situation	Item Title	Score			Notes
				P	F	Other	
99	11.3 (8-15)		Pushes car along				
100	11.8 (9-18)	L	Puts 3 or more cubes in cup				
101	12.0 (9-18)	G³	* Jabbers expressively				
102	12.0 (9-17)	P	Uncovers blue box				
103	12.0 (8-18)	Q	Turns pages of book				
104	12.2 (8-19)		Pats whistle doll, in imitation				
105	12.4 (7-18)	D²	Dangles ring by string				
106	12.5 (9-18)	N	* Imitates words (Record words used)				
107	12.9 (10-17)	P	Puts beads in box (6 of 8)				
108	13.0 (10-17)	O	Places 1 peg repeatedly				
109	13.4 (10-19)	J	Removes pellet from bottle				
110	13.6 (10-20)	R	Blue board: places 1 round block (Specify)				Items 110, 121, 129, 142, 155, 159, 160 _____No. round placed _____No. square placed _______Completion time
111	13.8 (10-19)	H¹	Builds tower of 2 cubes (Note number of cubes)	✓			Items 111, 119, 143, 161 _____No. of cubes
112	14.0 (10-21)	M	Spontaneous scribble	✓			
113	14.2 (10-23)	G³	* Says 2 words (Note words)				Heard: Reported:
114	14.3 (11-20)	L	Puts 9 cubes in cup				
115	14.6 (10-20)	P	Closes round box	✓			
116	14.6 (11-19)		* Uses gestures to make wants known	✓			
117	15.3 (11-23)	N	Shows shoes or other clothing, or own toy	✓			
118	16.4 (13-20)	O	Pegs placed in 70 seconds (Note times)	✓			Items 118, 123, 134, 156 Trial 1 2 3 Time _____ _____ _____
119	16.7 (13-21)	H¹	Builds tower of 3 cubes	✓	X		base of 2 ?
120	16.8 (12-26)	S	Pink board: places round block (Specify)	✓			Items 120, 137, 151 _____Round placed _____All placed _____All placed (reversed board)
121	17.0 (12-26)	R	Blue board: places 2 round blocks	✓			

* May be observed incidentally.

To score: Check P (Pass) or F (Fail). If "Other," mark O (Omit), R (Refused), or RPT (Reported by mother).

Item No.	Age Placement and Range (Months)	Situation	Item Title	Score P	Score F	Score Other	Notes
122	17.0 *(12-24)*		Attains toy with stick	✓			& then pushed it back — other times hit it till it bounce to her
123	17.6 *(14-22)*	O	Pegs placed in 42 seconds		✓		
124	17.8 *(13-27)*	T	Names 1 object (Check objects named)	✓			Items 124, 138, 146 ✓ Ball ___ Watch ✓ Pencil ___ Scissors ___ Cup
125	17.8 *(13-26)*	M	Imitates crayon stroke	✓			| \\
126	17.8 *(14-26)*	U	Follows directions, doll (Check parts passed)	✓			✓ Chair ✓ Handkerchief ✓ Cup
127	18.8 *(14-27)*	G³	* Uses words to make wants known	✓			Baby
128	19.1 *(15-26)*	U	Points to parts of doll (Check parts recognized)	✓			✓ Hair ✓ Mouth ___ Ears ✓ Hands ✓ Eyes ✓ Feet ✓ Nose
129	19.3 *(14-30+)*	R	Blue board: places 2 round and 2 square blocks	✓			
130	19.3 *(14-27)*	V	Names 1 picture (Check list)		✓		Items 130, 132, 139, 141, 148, 149 Names / Points Dog ___ / ___ Shoe ___ / ✓ Cup ___ / ___ House ___ / ✓ Clock ___ / ✓ Flag ___ / ✓ Star ___ / ✓ once but not again - H. said it was chance Leaf ___ / ___ Purse ___ / ___ Book ___ / ✓ No. Named ___ ___ No. Pointed
131	19.7 *(14-30+)*		Finds 2 objects (Check successful trials)		✓		Trial 1 2 3 Ball ✓ ___ ___ Rabbit ___ ___ ___
132	19.9 *(16-28)*	V	Points to 3 pictures (Check list at item 130)	✓			
133	19.9 *(15-27)*	W	Broken doll: mends marginally		✓		
134	20.0 *(16-29)*	O	Pegs placed in 30 seconds		✓		
135	20.5 *(14-30+)*	M	Differentiates scribble from stroke		✓		
136	20.6 *(16-30)*	G³	* Sentence of 2 words		✓		
137	21.2 *(16-30+)*	S	Pink board: completes	✓			
138	21.4 *(16-30)*	T	Names 2 objects		✓		
139	21.6 *(17-30+)*	V	Points to 5 pictures (Check list at item 130)		✓		

* May be observed incidentally.

To score: Check P (Pass) or F (Fail). If "Other," mark O (Omit), R (Refused), or RPT (Reported by mother).

Item No.	Age Placement and Range (Months)	Situation	Item Title	Score			Notes
				P	F	Other	
140	21.9 (15-30)	W	Broken doll: mends approximately		✓		
141	22.1 (17-30+)	V	Names 3 pictures (Check list at item 130)		✓		
142	22.4 (16-30+)	R	Blue board: places 6 blocks		✓		
143	23.0 (17-30+)	H'	Builds tower of 6 cubes				
144	23.4 (16-30+)	X	Discriminates 2: cup, plate, box (Check which)				Items 144, 152 _____Cup _____Box _____Plate _____All
145	23.8 (17-30+)	Y	Names watch, 4th picture (Check at which named)				Items 145, 150 _____5th picture _____3rd picture _____4th picture _____2nd picture
146	24.0 (17-30+)	T	Names 3 objects				
147	24.4 (19-30+)	M	Imitates strokes: vertical and horizontal				
148	24.7 (19-30+)	V	Points to 7 pictures (Check list at item 130)				
149	25.0 (19-30+)	V	Names 5 pictures (Check list at item 130)				
150	25.2 (18-30+)	Y	Names watch, 2nd picture				
151	25.4 (18-30+)	S	Pink board: reversed				
152	25.6 (18-30+)	X	Discriminates 3: cup, plate, box				
153	26.1 (16-30+)	W	Broken doll: mends exactly				
154	26.1 (19-30+)	H'	Train of cubes				
155	26.3 (19-30+)	R	Blue board: completes in 150 seconds				
156	26.6 (19-30+)	O	Pegs placed in 22 seconds				
157	27.9 (22-30+)	M	Folds paper				
158	28.2 (22-30+)	Z	Understands 2 prepositions				
159	30.0 (22-30+)	R	Blue board: completes in 90 seconds				
160	30+ (22-30+)	R	Blue board: completes in 60 seconds				
161	30+ (22-30+)	H'	Builds tower of 8 cubes				
162	30+ (21-30+)	H'	Concept of one				
163	30+ (23-30+)	Z	Understands 3 prepositions				

Name ACD 2 Date of Birth 12|5|74

Center Project Child Date (s) of Testing 4|77

ATTENTION SCORESHEET

	VISUAL		AUDITORY	
	Social	Non Social	Social	Non Social
A. Attention				
1. Does the child attend to the Stimuli at all?		yes		yes
2. Trial on which the child first attended		1		1
3. Amount of attention to the stimuli (low/ moderate level)		moderate		moderate
B. Habituation What is the effect of repeated trials on attention?				
1. habituation				
2. variable habituation				
3. no habituation-high attention				
4. no habituation-low attention				✓
5. no habituation-variable attention				
6. increasing interest		✓		
C. Recovery What is the effect of stimulus change on attention?				
1. recovery				
2. low/no recovery-high attention				
3. low/no recovery- low attention		✓ no fixation		
4. negative recovery - aversive reaction				✓

D. Preference

Is there a modality preference in attending Visual [✓ Auditory]

Is there a social-nonsocial preference Social Nonsocial

Name 9002

Date of Birth 12|5|74

Center Project Child

Date of Testing 4/12/77

OBJECT PERMANENCE SCORESHEET

Stages in the Development of Object Permanence

A. Some internal construction of an object from repeated experience with it

- ☐ does not have the construct
- ☐ in a transitional stage
- ✓ has the construct

B. The beginnings of the concept of object permanence

- ☐ does not have the concept
- ☐ in a transitional stage
- ☐ has the concept
- ✓ can work with the concept in more complex situations

C. Increased endurance of internal representations of objects

- ☐ does not have the skill
- ✓ has the skill

D. Higher level of object permanence--ability to search for an object that is hidden indirectly

- ☐ does not have the concept
- ☐ has the concept
- ✓ has the concept even in more complex situations

E. Increasing mobility of central processes (dealing with internal representation) leading up to representational thought

_____ does not have the ability

__✓__ in transitional stage

_____ has the ability

Notes:

Name: A002 1178

D.O.B.: 12/3/74

Center: Project Child

Date of Testing: 4/12/77

Mirror Task Score Sheet

1. Child's Affect in Response to the Mirror:

   ✓ Smile, Laugh

   ____ Frown, Cry

   ____ No Facial Expression

Comments: ____

2. Developmental Stage of Mirror Response:

   ____ Stage 1

   ____ Stage 2

   ____ Stage 3

      ____ body directed behavior

      ____ imitation

         ____ wave, bounce

         ____ facial imitation

      ____ turning response to person-behind

   ✓ Stage 4

      ✓ nose directed behavior

      ____ imitation

         ____ wave, bounce

         ____ facial imitation

      ____ turning response to person-behind

Comments: imitated waves of person behind, but did not turn around

Name A 002

Date of Birth 12/5/74

Center Project Child

Date(s) of Testing 4/12/77

CAREY SCALE SCORESHEET

1. Overall Rating

easy [✓ intermediate easy] intermediate intermediate difficult difficult

2. Subscales

Activity:	Low		Medium		[✓ High]
* Rhythmicity:	Regular		Variable		Irregular
Adaptability:	[✓ Adaptable]		Variable		Not Adaptable
Approach:	Approach	[✓ approach-variable]	Variable		Withdrawal
Threshold:	High		Medium	[✓ medium-low]	Low
Intensity:	Moderate		[✓ Variable]		Intense
Mood:	[✓ Pleasant]		Variable		Negative
Distractability:	Distractable	[✓ distractable-variable]	Variable		Not Distractab
Persistence	Persistent		[✓ Variable]		Not Persistent

*Rhythmicity score could not be derived; too few items answered

New Dictation Checklist

Name ____________________

Departure - Knock to leaving

Mother's Style:
1. sneaks out - no information
2. non-verbal preparation;sneaks out
3. informs and/or reasons
[✓ 4. informs, reasons and instructs]

Infant's Behavior
1. didn't notice at all
2. notice (look) but continue activity
3. looked at M the whole time (no movement to door)
4. frozen stare the whole time
5. protest fret/cry
[✓ 6. follow M to door]

Separation - Mother closes door

Infant's behavior: 1. no protest

protest [✓ 2. protests immediately (5-10")]
[✓ 3. delayed protest]

play 4. immediate play
[✓ 5. delayed play]

door 6. look at door
[✓ 7. approach door]
[✓ 8. hit/bang door or play with handle]
9. do nothing the whole time

Reunion - Mother opens door

Mother's behavior:
[✓ 1. approaches infant]
2. approaches chair or other
[✓ 3. vocalization - talks]
[✓ 4. proximal]
5. distal

Infant's behavior:
[✓ 1. approaches mother]
2. vocalization - talks
3. acknowledges mother's re-entry and continues play
4. acknowledges mother's re-entry and terminates or changes activity
5. didn't notice mother's re-entry

No Reunion

1. child left booth

2. other

479

BAYLEY SCALES OF INFANT DEVELOPMENT

MENTAL SCALE RECORD FORM

NAME ____ AGE ____ SEX M

	Year	Month	Day
Date Tested			
Date of Birth			
Age			

	Raw Score	Development Index*	
Mental Scale			(MDI)
Motor Scale			(PDI)

NOTES:

* The standard score for the Mental Scale is called the MDI (for Mental Development Index); for the Motor Scale it is the PDI (for Psychomotor Development Index). See Manual for discussion.

Note.—If both the MENTAL SCALE and the MOTOR SCALE are administered to the child, the information below need only be filled in on the Record Form for the MENTAL SCALE.

ADDRESS ____

BIRTHPLACE ____

BIRTH WEIGHT ____ BIRTH ORDER ____

PRENATAL OR BIRTH DIFFICULTIES ____

CHILD'S HEALTH ____

PARENT'S NAME ____

FATHER: EDUCATION ____ OCCUPATION ____

MOTHER: EDUCATION ____ OCCUPATION ____

HOUSEHOLD COMPOSITION

	Father	Mother	Siblings 1	2	3	4	5	6	7	8	Other Children 1	2	3
Check if Present in Household													
Approximate Age													
Sex (M for Male, F for Female)													

Comments:

PLACE OF TESTING Edison UCP

TESTED BY J.S.

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69-181AS

To score: Check P (Pass) or F (Fail). If "Other," mark O (Omit), R (Refused), or RPT (Reported by mother).

Item No.	Age Placement and Range (Months)	Situation	Item Title	Score P	F	Other	Notes
26	2.1 (.7-6)	E	Social smile: E smiles, quiet				
27	2.1 (1-6)	E	* Vocalizes to E's social smile and talk				
28	2.2 (.7-5)	AC	Searches with eyes for sound (Specify)				____Bell ____Rattle
29	2.3 (.7-5)		Eyes follow pencil				
30	2.3 (1-5)	G	* Vocalizes 2 different sounds				
31	2.4 (1-5)	E	Reacts to disappearance of face				
32T‡	2.5 (1-5)	H	Regards cube				
33	2.6 (1-5)	D^1	Manipulates red ring				
34	2.6 (1-5)	AC	Glances from one object to another				
35	2.6 (1-6)	B	Anticipatory adjustment to lifting				
36	2.8 (2-5)	C	Simple play with rattle				
37	3.1 (1-5)	D^1	Reaches for dangling ring				
38T	3.1 (2-5)		Follows ball visually across table				
39	3.2 (1-6)	G^1	* Fingers hand in play				
40T	3.2 (1-5)	D^1	Head follows dangling ring				
41T	3.2 (1-6)	I	Head follows vanishing spoon				
42	3.3 (2-6)	G^1	* Aware of strange situation				
43T	3.3 (2-6)	G^2	* Manipulates table edge slightly				
44	3.8 (2-6)	D^1	Carries ring to mouth				
45	3.8 (2-6)	G^1	* Inspects own hands				
46	3.8 (2-6)	D^1	Closes on dangling ring (Check hand preference)	✓			____Right ____Left ____None
47	3.8 (2-6)	A	Turns head to sound of bell	✓			
48	3.9 (2-6)	C	Turns head to sound of rattle	✓			
49	4.1 (2-6)	H	Reaches for cube	✓			
50	4.3 (2-7)	G^2	* Manipulates table edge actively		✓		

* May be observed incidentally.

‡ See Manual, Chapter 4, for explanation of "T."

To score: Check P (Pass) or F (Fail). If "Other, mark O (Omit), R (Refused), or RPT (Reported by mother).

Item No.	Age Placement and Range (Months)	Situation	Item Title	Score P	Score F	Score Other	Notes
51	4.4 (2-6)	H	Eye-hand coordination in reaching	✓			
52	4.4 (2-7)	J	Regards pellet	✓			
53	4.4 (2-7)	K	Mirror image approach		✓		
54	4.6 (3-7)	H	Picks up cube (Check hand preference)	✓			___ Right _✓_ Left ___ None
55	4.6 (3-8)	G³	* Vocalizes attitudes (Describe)				Pleasure: Displeasure: whine Eagerness: Satisfaction:
56	4.7 (3-7)	H	Retains 2 cubes		✓		can't do anything w right ha always clenched
57	4.8 (3-7)		Exploitive paper play	✓			
58	4.8 (3-8)	E¹	* Discriminates strangers				
59	4.9 (4-8)	C	Recovers rattle, in crib			o	
60	5.0 (3-8)	H	Reaches persistently	✓			awkward reaching
61	5.1 (3-8)	E¹	Likes frolic play	✓			
62	5.2 (4-8)	I	Turns head after fallen spoon	✓			
63	5.2 (4-8)	L	Lifts inverted cup		✓		
64	5.4 (4-8)	H	Reaches for 2nd cube		✓		
65	5.4 (3-12)	K	Smiles at mirror image		✓		turns away from mirror &. but never smiles at mirror
66	5.4 (4-8)	G²	* Bangs in play		✓		
67	5.4 (4-8)	D²	Sustained inspection of ring	✓			
68	5.4 (4-8)	D²	Exploitive string play	✓			
69	5.5 (4-8)	G²	* Transfers object hand to hand		✓		barely has any grasp w/l hand seems to have use of other
70	5.7 (4-8)	H	Picks up cube deftly and directly		✓		
71	5.7 (4-8)	D²	Pulls string: secures ring	✓			
72	5.8 (4-8)	G²	* Interest in sound production		✓		
73	5.8 (4-11)	L	Lifts cup with handle		✓		

* May be observed incidentally.

To score: Check P (Pass) or F (Fail). If "Other," mark O (Omit), R (Refused), or RPT (Reported by mother).

Item No.	Age Placement and Range (Months)	Situation	Item Title	Score			Notes
				P	F	Other	
74	5.8 (4-10)	M	Attends to scribbling	✓			
75	6.0 (5-10)	I	Looks for fallen spoon	✓			
76	6.2 (4-12)	K	Playful response to mirror		✓		
77	6.3 (4-10)	H	Retains 2 of 3 cubes offered		✓		
78	6.5 (5-10)	A¹	Manipulates bell: interest in detail		✓		
79	7.0 (5-12)	G³	* Vocalizes 4 different syllables		✓		
80	7.1 (5-10)	D²	Pulls string adaptively: secures ring		✓		
81	7.6 (5-12)	E¹	Cooperates in games				Note skill at pat-a-cake for Motor Scale item 44
82	7.6 (5-14)	H	Attempts to secure 3 cubes		✓		
83	7.8 (5-13)	A¹	Rings bell purposively		✓		not purposively - holding in hand + awkwardly moves hand
84	7.9 (5-14)	N	* Listens selectively to familiar words				
85	7.9 (5-14)	G³	* Says "da-da" or equivalent				
86	8.1 (6-12)	H¹	Uncovers toy				
87	8.9 (6-12)	O	Fingers holes in peg board				
88	9.0 (6-14)	L	Picks up cup: secures cube				
89	9.1 (6-14)	N	Responds to verbal request				
90	9.4 (6-13)	L	Puts cube in cup on command (Note number placed)		✓		Items 90, 100, 114 ___No. of cubes
91	9.5 (8-14)	P	Looks for contents of box				
92	9.7 (8-15)	L	Stirs with spoon in imitation				
93	10.0 (7-16)	Q	Looks at pictures in book				
94	10.1 (7-17)	M	Inhibits on command				
95	10.4 (7-15)	M	Attempts to imitate scribble				
96	10.5 (8-17)	H¹	Unwraps cube				
97	10.8 (8-17)	E¹	* Repeats performance laughed at				
98	11.2 (8-15)	M	Holds crayon adaptively				

* May be observed incidentally.

Name ______________________

Date of Birth 7/13/76

Center UCP Fresno

Date (s) of Testing 11/78

ATTENTION SCORESHEET

	VISUAL		AUDITORY	
	Social	Non Social	Social	Non Social
A. Attention				
1. Does the child attend to the Stimuli at all?		yes		yes
2. Trial on which the child first attended		1		1
3. Amount of attention to the stimuli (low/ moderate level)		moderate		moderate
B. Habituation				
What is the effect of repeated trials on attention?				
1. habituation				
2. variable habituation				20
3. no habituation-high attention				
4. no habituation-low attention				
5. no habituation-variable attention		✓		
6. increasing interest				
C. Recovery				
What is the effect of stimulus change on attention?				
1. recovery		did not		
2. low/no recovery-high attention		fixate on novel stimulus		
3. low/no recovery- low attention				✓
4. negative recovery - aversive reaction				

D. Preference

Is there a modality preference in attending	Visual	Auditory
Is there a social-nonsocial preference	Social	Nonsocial

Name _ ____

Center UCP Eason

Date of Birth 7/13/76

Date of Testing 11/18/77

OBJECT PERMANENCE SCORESHEET

Stages in the Development of Object Permanence

A. Some internal construction of an object from repeated experience with it

____ does not have the construct

____ in a transitional stage

____ has the construct

B. The beginnings of the concept of object permanence

____ does not have the concept

____ in a transitional stage

✓ has the concept

____ can work with the concept in more complex situations

C. Increased endurance of internal representations of objects

____ does not have the skill

____ has the skill

D. Higher level of object permanence--ability to search for an object that is hidden indirectly

____ does not have the concept

____ has the concept

____ has the concept even in more complex situations

E. Increasing mobility of central processes (dealing with internal representation) leading up to representational thought

_____ does not have the ability

_____ in transitional stage

_____ has the ability

Notes:

motor impairment prevents him from being able to grasp objects effectively. For this reason, he was passed on items when he moved the screen, even though he did not actually grasp the object. Technically, the child must grasp the object to pass items on this scale, but it was clear on certain items that had the concept but was not physically able to pick up the object.

Name _ ___ Date of Birth 7/13/76

Center UCP Edison Date of Testing 12/1/77

Socio-Emotional Scales Score Sheet

Fear John generally showed intense fear but was variable from situation to situation

	None	Mild	Moderate	Intense
Stranger approach		✓		
Stranger touches				✓

Anger/Frustration showed moderate anger/frustration

	None	Mild	Moderate	Intense
M grabs toy			✓	
M grabs snack			✓	

Happiness showed mild happiness

	None	Mild	Moderate	Intense
M praise	0			
Peek-a-boo			✓	
Surprise toy		✓		
Snack		✓		

Mirror-self } omitted these items because was upset
Mirror-other } by the end of the session

Name ______________________

Attachment/Stress showed intense attachment/stress to his mother's leaving and no attachment response to her return; however he had been crying intensely & he did quiet upon his mother's return

	None	Mild	Moderate	Intense
M returns	✓			
M leaves				✓

Competence showed a mild response to situations testing competence

	None	Mild	Moderate	Intense
Demonstration			✓	
Wants - M has		✓		
M leaves	✓			

Name:

D.O.B.: 7/13/76

Center: U.C.P., Edison

Date of Testing: 10/11/77

Mirror Task Score Sheet

1. Child's Affect in Response to the Mirror:

- ____ Smile, Laugh
- ____ Frown, Cry
- ✓ No Facial Expression

Comments: John exhibited absolutely no response to the mirror whatsoever

2. Developmental Stage of Mirror Response:

- ____ Stage 1
- ____ Stage 2
- ____ Stage 3
  - ____ body directed behavior
  - ____ imitation
    - ____ wave, bounce
    - ____ facial imitation
  - ____ turning response to person-behind
- ____ Stage 4
  - ____ nose directed behavior
  - ____ imitation
    - ____ wave, bounce
    - ____ facial imitation
  - ____ turning response to person-behind

Comments: John did not exhibit any response to the mirror and thus cannot be said to be even at Stage 1. It is not clear what the reason for this lack of response was nor whether this was his typical response to mirrors.

3. Did the child's response to mirror change from the "No Rouge" to the "Rouge Condition?"

____ Yes

  - ____ more mirror touching during "Rouge Condition"
  - ____ more body directed behavior during "Rouge Condition"
  - ____ more imitation during "Rouge Condition"
  - ____ change in affect during "Rouge Condition"--i.e., smile to cry or cry to smile
  - ____ more response to mirror in "No Rouge" than in "Rouge Condition"

[✓ No]

Comments: no response to mirror at all

4. Did the child show recognition of the mark on the Mother's/Caregiver's nose?

____ Yes

[✓ No]

Comments: ______________________________

490

Name ____________________ Date of Birth 7/13/76

Center UCP Edison Date(s) of Testing 11/77

CAREY SCALE SCORESHEET

1. Overall Rating

easy	[✓ intermediate easy]	intermediate	intermediate difficult	difficult

2. Subscales

Activity:	low		medium		[✓ high]
Rhythmicity:	[✓ regular]		variable		irregular
Adaptability:	[✓ adaptable]		variable		not adaptable
Approach:	approach		[✓ variable]		withdrawal
Threshold:	high	[✓]	medium		low
Intensity:	moderate		[✓ variable]		intense
Mood:	[✓ pleasant]		variable		negative
Distractability:	[✓ distractable]		variable		not distractable
Persistence:	persistent		[✓ variable]		not persistent

550

New Dictation Checklist

Name

Departure - Knock to leaving

Mother's Style:
1. sneaks out - no information
[✓ 2. non-verbal preparation;sneaks out]
3. informs and/or reasons
4. informs, reasons and instructs

Infant's Behavior
1. didn't notice at all
2. notice (look) but continue activity
[✓ 3. looked at M the whole time (no movement to door)]
4. frozen stare the whole time
5. protest fret/cry
6. follow M to door

Separation - Mother closes door

Infant's behavior: 1. no protest

protest [✓ 2. protests immediately (5-10")] not strong protest till later

3. delayed protest

play [✓ 4. immediate play]

5. delayed play

door 6. look at door

7. approach door

8. hit/bang door or play with handle

9. do nothing the whole time

Reunion - Mother opens door

Mother's behavior:

[✓ 1 approaches infant]

2. approaches chair or other

[✓ 3. vocalization - talks]

[✓ 4. proximal]

5. distal

Infant's behavior:

1. approaches mother

2. vocalization - talks

3. acknowledges mother's re-entry and continues play

[✓ 4 acknowledges mother's re-entry and terminates or changes activity]
wasn't doing anything

5. didn't notice mother's re-entry

No Reunion

1. child left booth

2. other

Appendix C

VITAE

MICHAEL LEWIS

BUSINESS ADDRESS: Institute for the Study of Exceptional Children
Department of Pediatrics
Rutgers Medical School
College of Medicine and Dentistry of New Jersey
Medical Research Building
New Brunswick, New Jersey

SOCIAL SECURITY NUMBER: 063-30-0875

EDUCATION

University of Pennsylvania	1959-1962	Ph.D.	Psychology
University of Pennsylvania	1959-1962	M.A.	Psychology
University of Pennsylvania	1954-1958	B.A. with Honors	Sociology

EXPERIENCE

1982-	Professor of Pediatrics, Department of Pediatrics, College of Medicine and Dentistry of New Jersey, Rutgers Medical School, Piscataway, N.J.
1980-1982	Adjunct Professor, Department of Pediatrics, College of Medicine and Dentistry of New Jersey, Rutgers Medical School, Piscataway, N.J.
1981	Visiting Professor, Department of Psychology, Princeton University, Princeton, N.J.
1979-1980	Professor of Psychology, Rutgers University, New Brunswick, N.J.
1979-1980	Adjunct Professor of Psychology, Temple University, Philadelphia, Pa.
1977-1982	Director, Institute for the Study of Exceptional Children, Educational Testing Service, Princeton, N.J.
1977-	Senior Research Scientist, Pediatric Service, The Roosevelt Hospital - St. Luke's Medical Center, New York, N.Y.
1973-1978	Visiting Professor, Graduate Center, City University of New York, New York, N.Y.
1972-	Clinical Professor of Pediatric Psychology, Columbia University, College of Physicians and Surgeons, New York, N.Y.
1971-1982	Senior Research Psychologist, Educational Testing Service, Princeton, N.J.
1971-1978	Director, Infant Laboratory, Educational Testing Service, Princeton, N.J.
1970-1974	Adjunct Professor, University of Pennsylvania, Graduate School of Education, Philadelphia, Pa.
1969-1974	Visiting Professor in Developmental Psychology, New School for Social Research, New York, N.Y.
1969	Visiting Senior Research Fellow, University of Strathclyde, Scotland

EXPERIENCE (continued)

1968-1971	Research Psychologist, Center for Psychological Studies, Educational Testing Service, Princeton, N.J.
1966-1968	Senior Investigator in Psychology, Fels Research Institute, Yellow Springs, Oh.
1965-1968	Associate Professor of Psychology, Antioch College, Yellow Springs, Oh.
1965	Visiting Associate Professor of Psychology, Harvard University, Cambridge, Ma.
1962-1965	Assistant Professor of Psychology, Antioch College, Yellow Springs, Oh.
1962-1966	Research Associate in Psychology, Fels Research Institute, Yellow Springs, Oh.
1960-1962	Research Fellow, National Institute of Mental Health, Bethesda, Md.
1959-1960	Teaching Assistant in Psychology, University of Pennsylvania, Philadelphia, Pa.

PROFESSIONAL ASSOCIATIONS

American Psychological Association, 1963--
Society for Research in Child Development, 1962--
Ohio Academy of Science, 1964-1968
New York Academy of Science, 1969--
Psychologists Interested in the Advancement of Psychotherapy (PIAP), 1963--
American Psychological Association, Divisions 6, 7, 8, 29, and 34, Psychophysiological, Development, Personality, Psychotherapy, and Population, 1963--
Society for Research in Psychophysiology, 1966-1977

PROFESSIONAL ACTIVITIES

Consultant, Robert Wood Johnson Foundation

Consultant, National Science Foundation

Consultant, Carnegie Corporation

Consultant, The Spencer Foundation

Consultant, W. T. Grant Foundation

Consultant, Mill Hill Infant Center, Trenton, N.J., 1970-

Consultant, Columbia University Lead Poisoning Study, Columbia Presbyterian Medical Center, New York, 1975-1978

PROFESSIONAL ACTIVITIES (continued)

Consultant, Longitudinal Study of Malnutrition and Mental Development, Bogota, Colombia, National Institute of Child Health and Human Development, 1975-1979

Member, Selective Study Section on Nutrition and Development, National Institute of Mental Health

Review Panel, Behavioral Sciences Branch, Center for Population Research, National Institute of Child Health and Human Development

Review Panel, Study Section on Human Development, National Institute of Child Health and Human Development, 1979-

Member, Board of Directors, American Foundation for Maternal and Child Health

Member, Editorial Board of Directors, International Association for Infant Mental Health

Member, Social Science Research Council, Committee on Social and Affective Development During Childhood, 1977-1982

Member, Advisory Committee of the Early Childhood Resource and Information Center, New York Public Libraries, 1981-

1979-	Consulting Editor, Infant Mental Health Journal
1978-1981	Consulting Editor, Infant Behavior and Development Journal
1978-	Consulting Editor, Journal of Applied Developmental Psychology
1978-	Consulting Editor, Child Development
1975-	Consulting Editor, Journal of Sex Roles
1973-1975	Consulting Editor, Monographs of the Society for Research in Child Development

Consulting Reader, Science

Consulting Reader, Journal of Experimental Child Psychology

Consulting Reader, Merrill-Palmer Quarterly

Consulting Reader, Psychological Bulletin

Consulting Reader, Perceptual and Motor Skills

Consulting Reader, Developmental Psychology

HONORS

Sigma Xi
Fellow, New York Academy of Sciences
Fellow, American Psychological Association - Divisions 7, 8, and 34
Fellow, American Association for the Advancement of Science

Masters' Lecturer, American Psychological Association, 1979
50th Anniversary Invited Speaker, Eastern Psychological Association, 1979
Invited Pickering Lecturer, Carleton University, Ottawa, Canada, 1979
Invited Plenary Speaker, Jean Piaget Society, May-June, 1980

The World Who's Who of Authors
Who's Who in New Jersey
Who's Who in the East
Who's Who in the United States (Who's Who Honarary Society of America)
Who's Who in North America
Who's Who Biographical Record - Child Development Professionals
Dictionary of International Biography
Men of Achievement
Men and Women of Distinction
International Who's Who of Community Serivce

INVITED PRESENTATIONS (since 1975)

Invited address: "Teacher as Lover." Merrill-Palmer Infant Conference, Detroit, Michigan, February 6-8, 1975.

Colloquium: "Children's Social Needs." Columbia Presbyterian Medical Center, New York, New York, February 25, 1975.

Invited participant: Child Care and Public Policy, University of Chicago, Chicago, Illinois, March 13-15, 1975.

Invited participant: NIMH meeting on Mother-Infant Interaction, Denver, Colorado, April 14, 15, 1975.

Colloquium: "Origins of Friendship." Rutgers University, Newark, New Jersey, April 24, 1975.

Colloquium: "Social Relationship and Growth of Competence." University of Pittsburgh, Pittsburgh, Pennsylvania, May 8, 9, 1975.

Lecture: "Young Children's Needs." Parent-Child Center, Trenton, New Jersey, May 14, 1975.

Colloquium: "The Origins of Social Behavior." Columbia Presbyterian Medical Center, New York, New York, June 10, 1975.

Plenary address: "The Infant's Social Network: The Relationship Between Attachment and Infant-Peer Interaction." Human Ethology Meetings, Sheffield, England, July 1975.

Colloquium: "The Effect of Poverty." Cambridge University (Unit for Research on Medical Applications of Psychology), Cambridge, England, July 15, 1975.

Colloquium: "Friendship and Peers in the Opening Years." Cambridge University (MRC Unit on the Development and Integration of Behaviour), Cambridge, England, July 21, 1975.

Invited lecturer: (a) "The Measurement of Intelligence;" (b) "The Infant's Social World: The Growth of Friendship and Peer Relations in the Opening Years;" (c) "The Measurement of CNS Dysfunction." Institute of Pathobiology's Continuing Medical Education Conference on Pediatrics.

Invited plenary address: "Social Responses to Social Objects: Infant Fear or Infant Greeting?" XIVth International Ethological Conference, Parma, Italy, August-September, 1975.

Colloquium: "Fear or Approach: Infant's Social Behavior." Providence, Rhode Island, November 5, 1975.

Participant: New York City Special Education Colloquium on Infant Development, Educational Testing Service, Princeton, New Jersey, November 14, 1975.

INVITED PRESENTATIONS (continued)

Grand Rounds: "Infant Intellectual Development." Babies Hospital, Columbia Presbyterian Medical Center, January 9, 1976.

Workshop: New Jersey Infant Programs, Middle County College, February 25, 1976.

Colloquium: "Infant Attention: A Measure of Intellectual Growth." Columbia Presbyterian Medical Center, New York City, March 8, 1976.

Colloquium: "The Origins of Friendship." Virginia Polytechnic Institute and State University, Blacksburg, Virginia, March 10, 11, 1976.

Invited lecturer: (a) "The Measurement of Central Nervous System Dysfunction;" (b) "The Mother-Infant Interaction and the Growth of Competence." Annual Pediatric Symposium, Chattanooga, Tennessee, March 18, 19, 1976.

Committee: Conference on Research in Infancy, Chapel Hill, North Carolina, March 26-28, 1976.

Colloquium: "Friendship and Peer Relations." University of California at Berkeley, Berkeley, California, April 15, 1976.

Invited speaker: "Conversation Hour: Early Socioemotional Development." American Educational Research Association meetings, San Francisco, California, March 19-21, 1976.

Invited symposium participant: Infant Perception, International Congress of Psychology, Paris, France, July 14-19, 1976.

Invited symposium participant: Early Social Development, International Primate Congress, Cambridge, England, August 25-27, 1976.

Grand Rounds: "Early Cognitive Development." Harlem Hospital, New York, New York, March 4, 1976.

Grand Rounds: "Cognitive Development in The First Two Years of Life." Roosevelt Hospital. New York, New York, July 23, 1976.

Invited discussant: Georgia Warm Springs Conference on Infant Central Nervous System Dysfunction and Measurement. Princeton, New Jersey, September 20, 21, 1976.

Invited address: "What is Natural: Laboratory vs. Field Studies." New York Academy of Sciences, New York, New York, October 16, 1976.

Invited address: Conference on Early Attachment - The Competent Infant, St. Francis Hospital and Ross Laboratories, Trenton, New Jersey, November, 1976.

Colloquium: "The Origins of Social Behavior." Princeton University, March, 1976.

INVITED PRESENTATIONS (continued)

Invited speaker: "The Mother-Infant Attachment System and the Child's Social World." Booth Maternity Hospital, Philadelphia, Pa., November 10, 1976.

Invited speaker: "The Origins of Self Competence." NIMH Conference on Affective States in Infants and Young Children, Washington, D. C., November 12 and 13, 1976.

Invited speaker: "The Elderly as Child Caregivers." Church Women's United Synagogues, November 30, 1976.

Invited speaker: "The Concept of the Self." The Ecology of Care and Education of Children Under Three - Symposium, West Berlin, February, 1977.

Invited participant: Pediatric Roundtable on Play and Learning. New Orleans, Louisiana, March, 1977.

Invited speaker: Conference on Contributions of the Child to Marital Quality and Family Interactions Across the Life Span. Plennsylvania State University, April, 1977.

Grand Rounds: "Infant Development." Columbia University Babies Hospital, New York, New York, April 29, 1977.

Invited speaker: Third Annual Interdisciplinary Institute of Pediatrics, Chattanooga, Tennessee, May 4, 1977.

Colloquium: "Peer Relationships in Infancy." Cornell University, Ithaca, New York, May 10-11, 1977.

Television lecture: "Birth Order." KYW, Philadelphia, Pa., June 1, 1977.

Invited speaker: Conference on Infant Intervention Programs, University of Wisconsin, Milwaukee, Wi., June 13-15, 1977.

Colloquium: "Social Cognition." Clark University, Worcester, Massachusetts, June 20-21, 1977.

Invited Speaker and Lecturer: International Research Seminar for Developmental Psychology, Trier, Germany, August 1-9, 1977.

Invited Speaker: International Conference for Study of Behavior Devleopment, Pavia, Italy, September 13-18

Grand Rounds: "The Child's Social Network." St. Luke's Hospital. New York, New York, October 4, 1977.

Invited Speaker: Tennessee State Paraprofessional Society Meeting, Chattanooga, Tennessee, October 10-11, 1977.

Invited Speaker: "Infant I.Q." Princeton Alumni Society, Nantucket, Massachusetts, October 13-16, 1977.

INVITED PRESENTATIONS (continued)

Invited Speaker: "Sex Differences in Language Development." New York Academy of Sciences, New York, New York, October 22, 1977.

Colloquium: "Social Development." University of Connecticut, Storrs, Conn. October 25-26, 1977.

Invited Speaker: Early Educational Practices Conference. University of Buffalo, Buffalo, New York, November 4-5, 1977.

Invited Speaker: "Infant Development." New York University, New York, N.Y., November 15, 1977.

Colloquium: "The Communication of Poverty." Yale University, New Haven, Connecticut, December 7, 1977.

Lecturer: "Early Development and Dysfunction." Midland School for Handicapped Children, North Branch, New Jersey, December 12, 1977.

Colloquium: "The Social Nexus." Downstate Medical Center, State University of New York, Brooklyn, New York, December 21, 1977.

Colloquium: "The Infant's Social World." Research Center for Group Dynamics, Institute for Social Research, University of Michigan, Ann Arbor, January, 25, 1978.

Colloquium: "Social Relationships in Early Childhood." Temple University, Philadelphia, Pa., February 24, 1978.

Workshop: "Principle of Development Related to Handicapped Children." Project Update, Middlesex County College, New Jersey, February 15, 1978.

Presentation: "The Infant's Social Nexus." 30th Anniversary Symposium of the Society of Medical Psychoanalysts, Changing Concepts in Psychoanalysis, New York, New York, March 12, 1978.

Grand Rounds: "The Young Child's Social World." Psychiatric Service, St. Luke's Hospital, New York, New York, March 29, 1978.

ETS Seminar: "Developmental Principles as a Guide to Early Educational Programs." Series on Assessment and Education of the Handicapped. April 4, 1978.

Presentation: "Psychological Dimensions of Poverty and Their Transmission from Parent to Child." Developmental Lunch Group, Department of Psychology, Yale University, New Haven, Connecticut, April 5, 1978.

Grand Rounds: "Infant Social Relations." Department of Pediatrics, Harlem Hospital Center, New York, New York, April 6, 1978.

Grand Rounds: "Developmental Principles in Intervention." Hahnemann Medical College and Hospital, Community Mental Health/Mental Retardation Center, Philadelphia, Pennsylvania, April 6, 1978.

INVITED PRESENTATIONS (continued)

Guest speaker: "Temperament Differences in Infants." Class on Mother-Infant Interaction, YWCA, Princeton, New Jersey, November 15, 1978.

Colloquium: "Social Cognition and the Acquisition of Self." Rockefeller University, New York, New York, November 16, 1978.

Colloquium: "The Sociobiology of Social Awareness." Departments of Biology and Psychology, William Paterson College, Wayne, New Jersey, December 14, 1978.

Ad hoc reviewer: NICHD Study Section on Human Development, Bethesda, Maryland, February 27-March 2, 1979.

Keynote address: "Developmental Issues and the Handicapped Infant." South Central Conference on Early Education for the Handicapped, Springfield, Missouri, April 12, 1979.

ETS Lecturer: "Early Social Development: The Child and Its Family." Educational Testing Service Lectures for the International Year of the Child, Educational Testing Service, Princeton, New Jersey, April 17, 1979.

Invited address: "The Social Nexus: Toward a Theory of Social Development." Eastern Psychological Association meetings, Philadelphia, April 19, 1979.

Participant: Professional Program Session on Early Childhood Research, representing the Institute for the Study of Exceptional Children at the Council for Exceptional Children Annual Interantional Convention, Dallas, April 22-27, 1979.

Invited presentation: "Self-Knowledge and Sex-Role Development: It's Not What You Do or How You Behave, But What You Think." Department of Psychology, University of Texas at Arlington, April 27, 1979.

Host: "Young Handicapped Children: Policy Directions for New Jersey." Conference sponsored by the Institute for the Study of Exceptional Children and the Johnson & Johnson Baby Products Company at the Henry Chauncey Conference Center, Educational Testing Service, Princeton, New Jersey, May 7, 1979.

Colloquium presentation: "Attentional Processes in High Risk Infants." Department of Psychology, University of Virginia, Charlottesville, Virginia, May 16, 1979.

Host: Meeting of the Social Science Research Council's Committee on Affective and Social Development During Childhood, Henry Chauncey Conference Center, Educational Testing Service, Princeton, New Jersey, May 19, 1979.

Reviewer: NICHD Study Section on Childhood Antecedents of Habitual Cigarette Smoking, Bethesda, Maryland, May 22-25, 1979.

Consultant: Site visit for NICHD Human Development Study Section, University of California, Los Angeles, May 30, 1979.

INVITED PRESENTATIONS (continued)

Invited address: "Developmental Issues and the Handicapped Infant." Institute on Emerging Perspectives in Infant and Toddler Development: Educational Implications for the Young Handicapped Child, Teachers College, Columbia University, New York, New York, June 4, 1979.

Invited presentation: "Early Cognition and Social Development." Pediatrics Department, Princeton Medical Center, Princeton, New Jersey, June 5, 1979.

Host: Orientation program on the Institute for the Study of Exceptional Children for members of the Executive Advisory Board of Educational Testing Service, at the Infant Laboratory, Educational Testing Service, Princeton, New Jersey, June 5, 1979.

Interview: "Father-Infant Relationships." Reported in the New York Times Magazine article, "A New Look at Life with Father," June 17, 1979.

Invited presentation: "The Changing American Family: Implications for Development." Ira J. Gordon Memorial Conference on Parent Education and Involvement, University of North Carolina at Chapel Hill, North Carolina, June 19, 1979.

Invited presentation: "Early Mother-Infant Communication System and Its Relationship to Language Development." International Society for the Study of Behavioral Development, Lund, Sweden, June 25-29, 1979.

Invited presentation: "The Development of Self in the First Two Years of Life." Symposium on the "Personality Problems in Young Children," International Congress of Psychology of the Child, Paris, France, July 1-6, 1979.

Co-chairman: National Symposium on Developmental Disabilities in the Preschool Child: Early Identification, Assessment and Intervention Strategies, Chicago, September 6-8, 1979.

Invited presentation: "Study of Attention Across Different Groups of Dysfunction." Symposium on Motor and Cognitive Development at the National Symposium on Developmental Disabilities in the Preschool Child: Early Identification, Assessment and Intervention Strategies, Chicago, September 6-8, 1979.

Chairman: Symposium entitled, "The Role of Parents in Young Handicapped Children's Development" at the American Psychological Association meetings, New York, September 1-5, 1979.

Paper Presentation: "Handicapped Infants and Their Mothers at Play." Symposium on Handicapped Infants and Their Mothers at the American Psychological Association meetings, New York, September 1-5, 1979.

Invited Masters' Lecturer: "Self Knowledge, Gender Identity, and Sex Role Development." American Psychological Association meetings, New York, September 4, 1979.

Invited presentation: "Early Social Development: The Child and Its Family." Child Psychiatry Grand Rounds, College of Physicians and Surgeons of Columbia University, New York, September 19, 1979.

INVITED PRESENTATIONS (continued)

Presentation: Workshop on Childlessness and the One-Child Family, National Institute of Child Health and Human Development, Bethesda, Maryland, September 20-21, 1979.

Presentation: "The Development of Self." Colloquium series, The Roosevelt Hospital, New York City, New York, October 17, 1979.

Interview: "Early Sex Role Development." WTTM Radio's "Capital City Forum", Trenton, New Jersey, October 18, 1979.

Invited 1979 Pickering Lecturer: "Developmental Principles and Educational Practice." Department of Psychology, Carleton University, Ottawa, Canada, October 26, 1979.

Presentation: "The Family." Workshop entitled Changing Characteristics of the U. S. Family: Implications for Family Relationship and Child Development at the Canadian Association for Young Children meetings, Ottawa, Canada, October 26-27, 1979.

Interview: "Children's Intellectual Abilities." CBC Radio, Ottawa, Canada, October 27, 1979.

Invited address: "Interactional Model of Development." Session entitled, Social Science Perspectives on Child Health and Development: Nature Versus Nurture in the 1970's at a Conference on Social Science in Health at the 107th Annual Meeting of the American Public Health Association, New York, November 4-6, 1979.

Participant: Conference on Childbirth in America, New York, November 9, 1979.

Reviewer: Human Development Study Section, National Institute of Health, Silver Springs, Maryland, November 14-16, 1979.

Participant: Seminar on Emotion and Cognition sponsored by the Committee on Social and Affective Development During Childhood, Social Science Research Council, San Francisco, November 16-17, 1979.

Invited presentation: "Social Cognition and the Development of Self." Seminar on Infant Development, The Graduate School and University Center of the City University of New York, New York, November 20, 1979.

Consultant: Program of Pediatric Assessment of Developmental Status at the Division of Child and Adolescent Psychiatry, University of Maryland, November 26, 1979.

Invited presentation: "The American Family at Dinner." Conference on The Family as a Learning Environment, Educational Testing Service, Princeton, New Jersey, November 28 - December 1, 1979.

Paper presentation: "The Infant Assessment Profile." Conference on Children's Early Education sponsored by the Bureau for Education of the Handicapped, Washington, D.C., December 3-7, 1979.

INVITED PRESENTATIONS (continued)

Invited presentation: "Newton, Einstein, Piaget, and the Self." Seminar series sponsored by the Department of Psychology, Rutgers University, New Brunswick, New Jersey, December 7, 1979.

Invited presentation: "Social Cognition and the Acquisition of Self." Grand Rounds Committee, Department of Psychiatry, Downstate Medical Center of the City University of New York, New York, December 12, 1979.

Invited presentation: "The Social Nexus." Research seminar in Child Mental Health, Department of Psychiatry, Albert Einstein College of Medicine, New York, January 8, 1980.

Participant: Meeting of the Social Science Research Council's Committee on Affective and Social Development During Childhood, New York, January 30-31, 1980.

Consultant: Site visit of Dr. Roy John's Laboratory and project entitled, "Analysis of Sources of Variation of Brain Electrical Activity and the Early Diagnosis of Learning Disabilities" conducted by the National Science Foundation in New York, February 12, 1980.

Invited colloquium speaker: "The Social Nexus." Colloquium series sponsored by the Department of Psychology, University of Delaware, Newark, Delaware, February 20, 1980.

Invited presentation: "The Social Development of the Child: Epigenetic Versus Social Network Approach." Research-Into-Practice Seminar sponsored by the Educational Testing Service Atlanta Regional Office, Atlanta, Georgia, February 22, 1980.

Invited presentations: "Sadness and Depression." Millhill Infant Center, Trenton, New Jersey, Febraury 26 and 28, 1980.

Reviewer: Human Development Study Section, National Institutes of Health, Washington, D. C., March 4-7, 1980.

Invited participant: The reception for the Chinese Delegation on Development and Pediatrics at the Chinese UN Mission, New York, New York, March 24, 1980.

Invited lecture: "The Social Development of the Young Child." Invited Visiting Lecture Series, Department of Psychiatry, College of Medicine and Dentistry of New Jersey, Rutgers Medical School, Piscataway, New Jersey, March 24, 1980.

Invited presentation: "Development Models in the Early Detection of Developmental Dysfunction." Grand Rounds on Developmental Dysfunction, Middlesex General Hospital, CMDNJ -Rutgers Medical School, New Brunswick, New Jersey, March 25, 1980.

Invited keynote speaker: "Developmental Theory and Developmental Dysfunction." Virginia Department of Education, First Chance Network, Fairfax, Virginia, March 28, 1980.

INVITED PRESENTATIONS (continued)

Invited colloquium speaker: "Newton, Einstein, Piaget and the Concept of Self." Seminar series sponsored by University of California at Berkeley, April 2, 1980.

Meeting of the board of directors of the International Association of Infant Mental Health, Ann Arbor, Michigan, April 4, 1980.

Keynote speaker: "Developmental Principles and Educational Practices." Michigan Association for Infant Mental Health, Ann Arbor, Michigan, April 7, 1980.

Chairperson: Invited address by Lewis Lipsitt, Eastern Psychological Association Meetings, Hartford, Connecticut, April 10, 1980.

Participant: Conference on the Development of Self sponsored by the Social Science Research Council Committee on Social and Affective Development, Poughkeepsie, New York, April 13-15, 1980.

Invited participant: "Problems in Research with the Handicapped." BEH Conference on Handicapped and At Risk Infants: Research and Application, Monterey, California, April 28 - May 1, 1980.

Invited plenary speaker: "Newton, Einstein, Piaget and the Concept of Self." Tenth Anniversary Piaget Society Meeting, Philadelphia, Pennsylvania, April 29, 1980.

Radio interview on Exceptional Infants, WCAU, Philadelphia, Pennsylvania, June 13, 1980.

Keynote speaker: "Social, Emotional, Intellectual, and Motor Development in the Preschool Child." Seminar series sponsored by Virginia State Department of Education, Richmond, Virginia, September 19, 1980.

Invited consultant: "Developmental Models and Assessment Issues." Third International Conference on Early Identification of Children Who are Developmentally "at-risk", Teton Village, Wyoming, September 21-26, 1980.

Interview for Channel 7 Eyewitness News, Princeton, New Jersey, September 29, 1980.

Invited speaker: "Socialization of Affect." SRCD Study Group on the Development of Emotion and Cerebral Asymetry, Tarrytown, New York, October 2-4, 1980.

Invited colloquium speaker: "Social Cognition and the Acquisition of Self." Seminar series sponsored by University of Pennsylvania, Philadelphia, Pennsylvania, October 7, 1980.

Participant: Meeting of the SSRC Committee on Social and Affect Development, New York, New York, October 9-10, 1980.

Participant: Meeting of the SSRC Committee on Comparative Research on Social Development in Infancy, New York, New York, October 16-17, 1980.

INVITED PRESENTATIONS (continued)

Participant: Meeting of the SSRC Committee on Developmental Psychopathology, New York, New York, November 4, 1980.

Invited colloquium speaker: "Social Development and the Beginnings of Self". Seminar series sponsored by Teacher's College, Columbia University, New York, New York, November 12, 1980.

Invited speaker: "Are Babies People?" Seminar series sponsored by the Jewish Family Service, Early Child Development Committee, Cincinnati, Ohio, November 17, 1980.

Invited participant: "Mother-Infant Affective Exchange." Symposium sponsored by University of Miami on Mother Infant Interaction and Affective Development, Miami, Florida, December 17-19, 1980.

Invited speaker: "The Socialization of Affect." Grand Rounds, University of Miami Medical Center, Miami, Florida, December 18, 1980.

Invited presentation: "Social Developmental Implications for Public Policy." Educational Testing Service, Washington, D.C., January 16, 1981.

Invited colloquium speaker: "Principles in the Early Development of Handicapped Children." Colloquium series sponsored by the Department of Psychology, Boston University, Boston, Massachusetts, January 22, 1981.

Invited colloquium speaker: "Some American Families at Dinner." Colloquium series sponsored by the Family Life Department, Boston University, Boston, Massachusetts, January 23, 1981.

Invited speaker: "Developmental Principles and Their Implications for Health, Assessment, and Intervention." Grand Rounds, Rutgers University Medical Center, New Brunswick, New Jersey, January 27, 1981.

Invited speaker: "Infants' Mental Development in the Opening Years of Life." Grand Rounds, Rutgers University Medical Center, New Brunswick, New Jersey, February 3, 1981.

Invited guest: "Social Development in Infancy." Charlie Rogers Television show, Washington, D.C., February 6, 1981.

Invited colloquium speaker: "Models of Early Social Development and Their Implications for Educational Policy." Colloquium series sponsored by The City University of New York, New York City, New York, February 9, 1981.

Invited speaker: "Social and Emotional Development." Grand Rounds, Rutgers University Medical Center, New Brunswick, New Jersey, February 10, 1981.

Invited speaker: "The Physician's Role in Diagnosis and Management of Mental Retardation." Lecture series sponsored by the College of Medicine, Northeastern Ohio Universities, Rootstown, Ohio, February 12, 1981.

Invited speaker: "The Development of Handicapped Infants." Grand Rounds, Rutgers University Medical Center, New Brunswick, New Jersey, February 17, 1981.

INVITED PRESENTATIONS (continued)

Participant: Meeting of the SSRC Committee on Affective and Social Development, New York, New York, March 1-2, 1981.

Participant: NICHD Human Development Study Section, Washington, D.C., March 8-10, 1981.

Participant: Mainstreatming National Advisory Committee meeting, Asilomar, California, March 12-13, 1981.

Participant: Society for Research in Child Development Biennial Meeting, Boston, Massachusetts, April 2-5, 1981.

Presentations: Society for Research in Child Development meetings, Boston, Massachusetts, April 2-5, 1981, Lewis & Staff.
"The socialization of emotion"
"The development of response skills in normal and retarded children"
"Patterns of learning by handicapped infants"
"Tyranny of the central tendency and other problems in studying handicapped infants"
"Mothers as mediators of the young child's reaction to a stranger"
"Temperament characteristics of atypical infants"
"First and only born children and their mothers in the opening two years of life"
"Social referencing at 10 months: A second order response to strangers"

Invited Speaker: "Measuring Cognitive Development." American Academy of Pediatrics, Plenary Session, Washington, D.C., April 6-7, 1981.

Invited colloquium speaker: "Measurement Problems of Handicapped Infants." Boston University, Boston, Massachusetts, April 9, 1981.

Invited colloquium speaker: "Some American Families at Dinner." Boston University, Boston, Massachusetts, April 10, 1981.

Symposium: Council for Exceptional Children's 59th Annual International Convention, "Teaching the Whole Child" A Unified Framework for Developing Curricula." New York, New York, April 12-17, 1981.

Presentations: Eastern Psychological Association, New York, New York, April 22-25, 1981, Lewis and Staff.
"Age changes in contingent learning"
"A cross cultural study of parent expectations"
"Implicit rule systems in developmental research"
"A factor analytic study of mother-infant interaction at 3, 12, and 24 months"
"Age as a social cognition"

Colloquium: "Social Development." Temple University, Philadelphia, Pennsylvania, May 7, 1981.

Colloquium: "Parent-Child Interactions in Normal and Handicapped Children." Ohio State University, Columbus, Ohio, May 12, 1981.

INVITED PRESENTATIONS (continued)

Colloquium: "Social Knowledge in Social Behavior." New York University, New York, New York, May 13, 1981.

Invited keynote speaker: "Peer Relations in Abused and Neglected Children." First Annual Conference of Professional Providers, Trenton, New Jersey, May 19, 1981.

Host: Conference on the Origins of Behavior, Princeton, New Jersey.
Paper presented: "The social network of 3-year olds: A developmental perspective," May 29-31, 1981.

Invited speaker: "Measuring CNS Function in Infants and Children." Morristown Memorial Hospital, Morristown, New Jersey, June 11, 1981.

Invited speaker: "Social Behavior and Social Knowledge," Annual conference, Black Analysis, Inc., Silver Spring, Maryland, June 12, 1981.

Participant: Human Development Study Section, Washington, D.C., June 29 - July 2, 1981.

Interview - "Some American Families at Dinner" The Washington Post, September 17, 1981.

Interview - "Toys" - Vermont Public Radio, September 21, 1981.

Interview: The Panorama Show "Some American Families at Dinner", Washington, D.C., September 29, 1981.

Invited Speaker: "Early Social Development". Bradley Forum 1981, Providence, Rhode Island, October 1, 1981.

Participant: Conference "Symbiosis in parent-young interaction: Consistency and change in mother-child interactions over the first 2 years of life". University of Chicago, October 15-18, 1981.

Interview: "Birth Order" - The Charley Rose Show, Washington D.C., October 27, 1981

Participant: Human Development Study Section, Washington, D.C., October 28-30, 1981

Invited Speaker: All Conference Lecturer "Social Development as a Cognitive Task". Children's Heart Hospital conference on Developmental Disorders. Philadelphia, Pa., November 6, 1981.

Invited Speaker: "Infancy: It's a family affair". Jewish Family Service, Cincinnati, Ohio, November 9, 1981.

Grand Rounds: "Developmental Models and Assessment Issues", Albert Einstein College of Medicine, Bronx, New York, November 16, 1981.

Invited Speaker: "Early Social Development". American Academy of Psychoanalysis 25th Winter Meeting, New York City, December 4, 1981.

April 1982

PUBLICATIONS

Michael Lewis, Ph.D.

Books and Monographs

1969

Lewis, M., Goldberg, S., & Campbell, H. A developmental study of information processing within the first three years of life: Response decrement to a redundant signal. *Monographs of the Society for Research in Child Development*, 1969, 34,(9, Serial No. 133). (#39)

1974

Lewis, M., & Rosenblum, L. (Eds.) *The effect of the infant on its caregiver: The origins of behavior* (Vol. 1). New York: Wiley, 1974. (#74)

Lewis, M., & Rosenblum, L. (Eds.) *The origins of fear: The origins of behavior* (Vol. 2). New York: Wiley, 1974. (#95)

1975

Lewis, M., & Rosenblum, L. (Eds.) *Friendship and peer relations: The origins of behavior* (Vol. 4). New York: Wiley, 1975. (#104)

1976

Goldman, K. S., & Lewis, M. *Child care and public policy: A case study*. Princeton, N.J.: Educational Testing Service, 1976. (#134)

Lewis, M. (Ed.) *The origins of intelligence: Infancy and early childhood*. New York: Plenum, 1976. (#87)

1977

Lewis, M., & Rosenblum, L. (Eds.) *Interaction, conversation, and the development of language: The origins of behavior* (Vol. 5). New York: Wiley, 1977. (#139)

Weinraub, M., & Lewis, M. The determinants of children's responses to separation. *Monographs of the Society for Research in Child Development*, 1977, 42(4), Serial No. 172. (#132)

1978

Lewis, M., & Rosenblum, L. (Eds.) *The development of affect: The genesis of behavior* (Vol. 1). New York: Plenum, 1978. (#172)

Pervin, L., & Lewis, M. (Eds.) *Perspectives in interactional psychology*. New York: Plenum, 1978. (#155)

1979

Hale, G., & Lewis, M. (Eds.) *Attention and cognitive development*. New York: Plenum, 1979. (#158)

Lewis, M., & Brooks-Gunn, J. *Social cognition and the acquisition of self*. New York: Plenum, 1979. (#160)

Lewis, M., & Rosenblum, L. (Eds.) *The child and its family: The genesis of behavior* (Vol. 2). New York: Plenum, 1979. (#181)

1981

Lewis, M., & Bosenblum, L. (Eds.) *The uncommon child: The genesis of behavior* (Vol. 3). New York: Plenum, 1981. (#227)

In Press

Lewis, M. (Ed.). *Origins of intelligence: Infancy and early childhood*. New York: Plenum, in press (second edition). (#251)

Lewis, M., & Michalson, L. *Children's emotions and moods: Theory and measurement*. New York: Plenum, in press. (#252)

Lewis, M., & Taft, L. (Eds.) *Developmental disabilities: Theory assessment and intervention*. Book from a Symposium on Developmental Disabilities in the Preschool Child: Early Identification, Assessment and Intervention Strategies, Chicago, September 1979. New York: S.P. Medical & Scientific Books, in press. (#224)

In Preparation

Lewis, M., & Brooks-Gunn, J. *The handicapped child: New directions in research and intervention*. New York: McGraw-Hill, 1982, in preparation. (#222)

Lewis, M. (Ed.). *Beyond the dyad*. New York: Plenum, 1982, in preparation. (#291)

Chapters

1966

Lewis, M. Some nondecremental effects of effort. *Journal of Comparative Physiological Psychology*, 1964, *57*, 367-372. Also in R. N. Haber (Ed.), *Current research in motivation*. New York: Holt, Rinehart, & Winston, 1966. (#5)

1967

Lewis, M. Mother-infant interaction and cognitive development: A motivational construct. Paper presented at a Symposium on Issues in Human Development, Philadelphia, November 1967. Also in V.C. Vaughn (Ed.), *Issues in human development*. Washington, D. C.: U. S. Government Printing Office, 1967, 32-38. (#25)

1969

Dorwart, W., Ezerman, R., Lewis, M., & Rosenhan, D. The effect of brief social deprivation on social and nonsocial reinforcement. *Journal of Personality and Social Psychology*, 1965, *2*, 111-115. Also in H. C. Lindgren (Ed.), *Contemporary research in social psychology: A book of readings*. New York: Wiley, 1969. (#8)

1971

Lewis, M. Individual differences in the measurement of early cognitive growth. In J. Hellmuth (Ed.), *Exceptional infant*, Vol. 2. New York: Brunner/Mazel, Inc., 1971, 172-221. (#51)

Lewis, M. Infancy and early childhood in the urban environment: Problems for the 21st century. Paper presented at the VIIth Congress of the European Cultural Foundation, Rotterdam, May 1970. Also in *Citizen and city in the year 2000*. Deventer, The Netherlands: Kluwer, 1971, 167-172. (#43)

1972

Freedle, R., & Lewis, M. Individual differences in play behavior: A mathematical analysis. In F. J. Monks, W. W. Hartup, & J. deWit (Eds.), *Determinants of behavioral development*. New York: Academic Press, 1972. (#72)

Lewis, M. Mothers and fathers, boys and girls: Attachment behavior in the one-year-old. In F. J. Monks, W. W. Hartup, & J. deWit (Eds.), *Determinants of behavioral development*. New York: Academic Press, 1972. (see also #49) (#71)

1973

Lewis, M. Infancy and early childhood: Research needs in the study of socioemotional development. In S. B. Sells (Ed.), Critical appraisal of research in the personality - emotional - motivation domain. IBR Report No. 73-25. Texas Christian University Institute of Behavioral Research, October 1973. (#90)

Lewis, M., & Freedle, R. Mother-infant dyad: The cradle of meaning. In P. Pliner, L. Krames, & T. Alloway (Eds.), Communication and affect: Language and thought. New York: Academic Press, 127-155, 1973. (#62)

1974

Lewis, M. The cardiac response during infancy. In R. F. Thompson & M. M. Patterson (Eds.), Methods in physiological psychology: Bio-electric recording techniques, part C, receptor and effector processes (Vol. I). New York: Academic Press, 1974, 201-229. (#65)

Lewis, M., & Brooks, J. Self, other and fear: Infants' reactions to people. Presented at a conference on The Origins of Behavior: Fear, Princeton, N. J., October 1973. Also in M. Lewis & L. Rosenblum (Eds.), The origins of fear: The origins of behavior (Vol. 2), New York: Wiley, 1974, 195-227. (#83)

Lewis, M., & Lee-Painter, S. An interactional approach to the mother-infant dyad. In M. Lewis & L. Rosenblum, (Eds.), The effect of the infant on its caregiver: The origins of behavior (Vol. I). New York: Wiley, 1974, 21-48. (#76)

Lewis, M., & Rosenblum, L. Introduction. In M. Lewis & L. Rosenblum (Eds.), The effect of the infant on its caregiver: The origins of behavior (Vol. 1). New York: Wiley, 1974. (#75)

Lewis, M., & Rosenblum, L. Introduction. In M. Lewis & L. Rosenblum (Eds.), The origins of fear: The origins of behavior (Vol. 2), New York: Wiley, 1974. (#96)

Lewis, M., & Weinraub, M. Sex of parent x sex of child: Socioemotional development. Paper presented at the International Institute for the Study of Human Reproduction Conference on Sex Differences in Behavior, Tuxedo, New York, October 1973. Also in R. C. Friedman, R. M. Richart, & R. L. Vande Wiele (Eds.), Sex differences in behavior. Huntington, New York: Krieger, 1974, 165-189. (#82)

1975

Lewis, M. The development of attention and perception in the infant and young child. In W. M. Cruickshank & D. P. Hallahan (Eds.), Perceptual and learning disabilities in children (Vol. 2). Syracuse: University Press, 1975, 137-162. (#93)

Lewis, M. Early sex differences in the human: Studies of socioemotional development. Archives of Sexual Behavior, 1975, 4(4). Also in E. A. Rubinstein, R. Green, & E. Brecher, New directions in sex research. New York: Plenum, 1975. (#119)

Lewis, M., & Brooks, J. Infants' social perception: A constructivist view. In L. Cohen & P. Salapatek (Eds.), Infant perception: From sensation to cognition (Vol. 2). New York: Academic Press, 1975, 101-143. (#84)

Lewis, M., & Lee-Painter, S. An infant's interaction with its social world: The origin of meaning. Paper presented at a Symposium on Parent-Child Observation Studies and Their Problems, at the Canadian Psychological Association meetings, Montreal, June 1972. Also appears as the origin of interactions: Methodological issues. In K. Riegal & G. C. Rosenwald (Eds.), Structure and transformation: Developmental and historical aspects (Vol. 3). New York: Wiley, 1975, 119-131. (#66)

Lewis, M., & Rosenblum, L. Introduction. In M. Lewis & L. Rosenblum (Eds.), Friendship and peer relations: The origins of behavior (Vol. 4). New York: Wiley, 1975. (#105)

Lewis, M., Young, G., Brooks, J., & Michalson, L. The beginning of friendship. Paper presented at a conference, The Origins of Behavior: Friendship and Peer Relations, Princeton, N.J., October 1974. Also in M. Lewis & L. Rosenblum (Eds.), Friendship and peer relations: The origins of behavior (Vol. 4). New York: Wiley, 1975, 27-66. (#98)

1976

Lewis, M. What do we mean when we say infant intelligence scores? A socio-political question. In M. Lewis (Ed.), The origins of intelligence: Infancy and early childhood. New York: Plenum Press, 1976. (#123)

Lewis, M., & Weinraub, M. The father's role in the infant's social network. In M. Lamb (Ed.), The role of the father in child development (Vol. 1). New York: Wiley, 1976, 157-184. (#131)

1977

Freedle, R., & Lewis, M. Prelinguistic conversations. In M. Lewis & L. Rosenblum (Eds.), Interaction, conversation, and the development of language: The origins of behavior (Vol. 5).. New York: Wiley, 1977. (#129)

Lewis, M. Parent-child interaction. In B. Wolman (Ed.), International encyclopedia of neurology, psychiatry, psychoanalysis, and psychology. New York: Van Nostrand Reinhold Co., 1977. (#142)

Lewis, M., & Ban, P. Variance and invariance in the mother-infant interaction; A cross cultural study. Paper presented at the Burg Wartenstein Symposium No. 57, Cultural and Social Influences in Infancy and Childhood, Burg Wartenstein, Austria, June 1973. Also in P. H. Leiderman & S. R. Tulkin (Eds.), *Cultural and social influences in infancy and early childhood*. Stanford: Stanford University Press, 1977. (#79)

Lewis, M., & Cherry, L. Social behavior and language acquisition. Paper presented at a conference, The Origins of Behavior: Communication and Language, Princeton, N.J., October 1975. Also in M. Lewis & L. Rosenblum (Eds.), *Interaction, conversation and the development of language: The origins of behavior* (Vol. 5). New York: Wiley, 1977. (#128)

Lewis, M., & Freedle, R. The mother and infant communication system: The effects of poverty. In H. McGurk (Ed.), *Ecological factors in human development*. Amsterdam, The Netherlands: North-Holland Publishing Company, 1977, 205-215. (#121)

Lewis, M., & Rosenblum, L. Introduction. In M. Lewis & L. Rosenblum (Eds.), *Interaction, conversation, and the development of language: The origins of behavior* (Vol. 5). New York: Wiley, 1977. (#140)

Lewis, M., & Zarin-Ackerman, J. Early infant development: The origins of social and intellectual development. In R. E. Behram & J. M. Driscoll (Eds.), *Neonatology*. St. Louis: The C. V. Mosby Company, 1977, 195-208. (#143)

1978

Brooks-Gunn, J., & Lewis, M. Early social knowledge: The development of knowledge about others. In H. McGurk (Ed.), *Issues in childhood social development*. London: Methuen, 1978, 79-106. (#178)

Cherry, L., & Lewis, M. Differential socialization of girls and boys: Implications for sex differeces in language development. In N. Waterson & C. Snow (Eds.), *The development of communication: Social and pragmatic factors in language acquisition*. London: Wiley, 1978. (#141)

Lewis, M. Situational analysis and the study of behavioral development. In L. Pervin & M. Lewis (Eds.), *Perspectives in interactional psychology*. New York: Plenum, 1978. 49-66. (#157)

Lewis, M., Brooks, J., & Haviland, J. Hearts and faces: A study in the measurement of emotion. Paper presented at a conference, The Origins of Behavior: Affect Development, Princeton, N.J., February 1977. Also in M. Lewis & L. Rosenblum (Eds.), *The development of affect: The genesis of behavior* (Vol. 1). New York: Plenum, 1978. (#174)

Lewis, M., & Brooks-Gunn, J. Self knowledge and emotional development. Paper presented at a conference, The Origins of Behavior: Affect Development, Princeton, N.J., February 1977. Also in M. Lewis & L. Rosenblum (Eds.), The development of affect: The genesis of behavior (Vol. 1). New York: Plenum, 1978. (#173)

Lewis, M., & Coates, D. Mother-infant interaction and infant cognitive performance. Paper presented at the 6th annual meeting of the International Primatological Society, Cambridge, England, August 1976. Also in D. J. Chivers & J. Herbert (Eds.), Recent advances in primatology: Behavior (Vol. 1). London: Academic Press, 1978, 125-130. (#145)

Lewis, M., & Feiring, C. The child's social world. In R. M. Lerner & G. D. Spanier (Eds.), Child influences on marital and family interaction: A life-span perspective. New York: Academic Press, 1978, 47-69. (#163)

Lewis, M., & Rosenblum, L. Issues in affect development. In M. Lewis & L. Rosenblum (Eds.), The development of affect: The genesis of behavior (Vol. I). New York: Plenum, 1978. (#175)

Pervin, L. & Lewis, M. Overview of the internal-external issue. In L. Pervin & M. Lewis (Eds.), Perspectives in interactional psychology. New York: Plenum, 1978, 1-22. (#156)

1979

Edwards, C. P., & Lewis, M. Young children's concepts of social relations: Social functions and social objects. Paper presented at a conference, The Origins of Behavior: The Social Network of the Developing Infant, Princeton, N. J., December 1977. Also in M. Lewis & L. Rosenblum (Eds.), The child and its family: The genesis of behavior (Vol. 2). New York: Plenum, 1979, 245-266. (#180)

Lewis, M. The social determination of play. In B. Sutton-Smith (Ed.), Play and learning. New York: Gardner Press, Inc., 1979, 23-33. (#236)

Lewis, M., & Baldini, N. Attentional processes and individual differences. In G. Hale & M. Lewis (Eds.), Attention and cognitive development. New York: Plenum, 1979, 135-142. (#159)

Lewis, M., & Brooks-Gunn, J. The search for the origins of self: Implications for social behavior and intervention. Paper presented at a Symposium on the Ecology of Care and Education of Children Under Three, Berlin, West Germany, February 23-26, 1977. Also in L. Montada (Ed.), Brennpunkte der Entwicklungspsycholgie. Stuttgart: W. Kohlhammer, GmbH, 1979, 157-172. (#169)

Lewis, M., & Brooks-Gunn, J. Toward a theory of social cognition: The development of self. In I. Uzgiris (Ed.), *New directions in child development: Social interaction and communication during infancy*. San Francisco: Jossey-Bass, 1979. (#197)

Lewis, M., & Feiring, C. The child's social network: Social object, social functions and their relationship. Paper presented at a conference, The Origins of Behavior: The Social Network of the Developing Infant, Princeton, N.J., December 1977. Also in M. Lewis & L. Rosenblum (Eds.), *The child and its family: The genesis of behavior* (Vol. 2). New York: Plenum, 1979, 9-27. (#179)

Lewis, M., & Rosenblum, L. Issues in the study of the social network. In M. Lewis & L. Rosenblum (Eds.), *The child and its family: The genesis of behavior* (Vol. 2). New York: Plenum, 1979, 1-7. (#182)

Lewis, M., & Starr, M. Developmental continuity. In J. Osofsky (Ed.), *Handbook of infant development*. New York: Wiley, 1979, 653-670. (#161)

1980

Fox, N., & Lewis, M. The role of maturation and experience in preterm infant development. In J. J. Gallagher (Ed.), *New directions in special education*. San Francisco: Jossey-Bass, 1980. (#210)

Lewis, M. Issues in the development of fear. In I. L. Kutash & L. B. Schlesinger (Eds.), *Pressure point: Perspectives on stress and anxiety*. San Francisco: Jossey-Bass, 1980. (#212)

Lewis, M. Self-knowledge: A social-cognitive perspective on gender identity and sex role development. In M. E. Lamb & L. R. Sherrod (Eds.), *Infant social cognition: Empirical and theoretical considerations*. Hillsdale, N.J.: Lawrence Erlbaum Associates, 1980. (#211)

Lewis, M., & Fox, N. Predicting cognitive development from assessments in infancy. In B. Camp (Ed.), *Advances in behavioral pediatrics* (Vol. 1). Greenwich, Conn.: JAI Press, 1980, 53-67. (#196)

1981

Feiring, C., & Lewis, M. Middle class differences in the mother-child interaction and the child's cognitive development. In T. Field (Ed.), *Culture and early interactions*. Hillsdale, N.J.: Lawrence Erlbaum, 1981. (#220)

Lewis, M. & Brooks-Gunn, J. La reconnaissance de son image chez l'infant et l'animal. Chapter in *Textes de Base en Psychologie*, P. Mounoud & A. Vintner (Eds.), Paris, 1981. (#282)

Lewis, M., & Brooks, J. Self, other and fear: The reaction of infants to people. Paper presented at a Symposium on Infants' Fear of the Strange at the Eastern Psychological Association meetings, Boston, April 1972. In J. Belsky (Ed.), *The beginning: Readings in infancy*. New York: Columbia University Press, 1981. (#63)

Lewis, M., & Feiring, C. Direct and indirect interactions in social relationships. In L. Lipsitt (Ed.), *Advances in infancy research* (Vol. 1). New York: Ablex, 1981. (#218)

Lewis, M., Feiring, C., & Weinraub, M. The father as a member of the child's social network. In M. Lamb (Ed.), *The role of the father in child development* (second edition). John Wiley & Sons, 1981. (#246)

Lewis, M., & Rosenblum, L. The uncommon as the common: A relative view (Introduction). In M. Lewis & L. Rosenblum (Eds.), *The uncommon child: The genesis of behavior* (Vol. 3). New York: Plenum, 1981. (#228)

Lewis, M., & Schaeffer, S. Peer behavior and mother-infant interaction in maltreated children. Paper presented at a conference on The Uncommon Child, Educational Testing Service, Princeton, New Jersey, March 30-April 2, 1980. In M. Lewis & L. Rosenblum (Eds.), *The uncommon child: The genesis of behavior* (Vol. 3). New York: Plenum, 1981. (#229)

1982

Brooks-Gunn, J., & Lewis, M. The development of self-knowledge. In C. B. Kopp & J. B. Krakow (Eds.), *The child: Development in a social context*. Reading, MA: Addison-Wesley Publishing Co., 1982. (#223)

In Press

Brinker, R., & Lewis, M. Contingency intervention in infancy. In J. Anderson (Ed.), *Curriculum materials for high risk and handicapped infants*. Chapel Hill, N.C.: Technical Assistance and Development System, in press. (#287)

Brinker, R., & Lewis, M. Implications of learning processes of handicapped infants. Chapter to appear in *Topics of special education*, C. Kopp (Ed.), in press. (#270)

Brooks-Gunn, J., & Lewis, M. Affective exchanges between normal and handicapped infants and their mothers. Chapter to appear in *Emotion and interaction: Normal and high risk infants*, T. Field & A. Fogel, (Eds.), New York: Erlbaum, in press. (#276)

Brooks-Gunn, J., & Lewis, M. The development of the self. *International Encyclopedia of Education*, 1982, in press. (#289)

Brooks-Gunn, J., & Lewis, M. Mirror-image stimulation and self recognition in infancy. Paper presented at the Society for Research in Child Development meetings, Denver, April 1975. Also in L. D. Steinberg (Ed.), *The life-span: Readings in human development*. New York: Columbia University Press, in press. (#109)

Brooks-Gunn, J., & Lewis, M. Parents of handicapped infants: Their role in identification, assessment, and intervention. Paper presented at a Symposium at the Ira J. Gordon Memorial Conference on Parent Education and Involvement, University of North Carolina, Chapel Hill, June 1979. In B. Leiler (Ed.), *Parent education and involvement*, in press. (#216)

Brooks-Gunn, J., & Lewis, M. Screening and evaluating the handicapped infant. *Topics in Early Childhood Special Education*, 1982, in press. (#278)

Feiring, C., & Lewis, M. First born and only children: Affective and cognitive development. In *The Only Child*, T. Falbo (Ed.), Guilford Press, in press. (#295)

Feiring, C., & Lewis, M. Only and first born children and their mothers in the opening 2 years of life. Chapter to appear in *Decision-making, family planning and child-bearing*, G.L. Fox (Ed.), Sage Publications, Inc., Berkeley, CA, in press. (#267)

Lewis, M. Attention as a measure of cognitive integrity. In M. Lewis & L. Taft (Eds.), *Developmental disabilities: Theory assessment and intervention*. New York: S. P. Medical and Scientific Books, in press. (#240)

Lewis, M. Newton, Einstein, Piaget, and the concept of the self. Paper presented at Jean Piaget Society Plenary Session, Philadelphia, May-June 1980. To appear in L. S. Liben (Ed.), *Piaget and the foundation of knowledge*. Hillsdale, New Jersey: Lawrence Erlbaum, in press. (#238)

Lewis, M. On the nature of intelligence: Science or bias? Chapter to appear in M. Lewis (Ed.), *Origins of intelligence: Infancy and early childhood*. New York: Plenum, 1983, in press. (#301)

Lewis, M. The social network systems: Toward a general theory of social development. In T. Field (Ed.), *Review of human development* (Vol. 1), in press. (#254)

Lewis, M., & Brooks-Gunn, J. Developmental models and assessment issues. In N. Anastasiow, W. Frankenburg, & A. Fandal (Eds.), *Identifying the developmentally delayed child*. Maryland: University Park Press, in press. (#273)

Lewis, M., & Brooks-Gunn, J. The self as social knowledge. In M. D. Lynch & A. A. Norem-Hebeisen (Eds.), Self-concept: Concepts, development, correlates, and applications, in press. (#199)

Lewis, M., & Feiring, C. Some American families at dinner. To appear in L. Laosa & I. Sigel (Eds.), The family as a learning environment (Vol. 1). New York: Plenum, in press. (#244)

Lewis, M., Feiring, C., & Kotsonis, M. The social network of 3-year-olds: A developmental perspective. Chapter to appear in Beyond the dyad: The genesis of behavior, Volume 4, Plenum, in press. (#283)

Lewis, M., & Michalson, L. The measurement of emotional state. In C. Izard (Ed.), Measurement of emotions in infants and children. New York: Cambridge University Press, in press. (#231)

Lewis, M., & Michalson, L. Mother's labeling of infant affect. Chapter to appear in Emotion and interaction: Normal and high risk infants, T. Field & A. Fogel (Eds.), New York: Erlbaum, in press. (#269)

Lewis, M., & Wehren, A. The tyranny of the central tendency and other problems in the study of handicapped children. Paper presented at a conference entitled Handicapped and At-Risk Infants: Research and Applications sponsored by the Bureau of Education for the Handicapped, Asilomar, California, April-May, 1980. In D. Bricker (Ed.), Application of research findings to intervention with at-risk and handicapped infants. Baltimore, MD: University Park Press, in press. (#239)

In Preparation/Submitted for Publication

Brooks-Gunn, J., & Lewis, M. Temperament and affective interaction in handicapped infants. Submitted for publication. (#304)

Lewis, M., & Brooks-Gunn, J. Social development of atypical infants. Chapter in preparation. (#279)

Lewis, M., & Feiring, C. The impact of the family on the disturbed child's development. In J. Blacher-Dixon (Ed.), Young severely handicapped children and their families. New York: Academic Press, in preparation. (#296)

Articles

1962

Cairns, R. B., & Lewis, M. Dependency and the reinforcement value of a verbal stimulus. Journal of Consulting Psychology, 1962, 26, 1-8. (#1)

1963

Lewis, M., Meyers, W., Kagan, J., & Grossberg, R. Attention to visual patterns in infants. Paper presented at a Symposium on Studies of Attention in Infants: Methodological Problems and Preliminary Results at the American Psychological Association meetings, Philadelphia, 1963. Also in American Psychologist, 1963, 18, 357 (Abstract). (#3)

Lewis, M., Wall, A. M., & Aronfreed, J. Developmental changes in the relative values of social and nonsocial reinforcement. Journal of Experimental Psychology, 1963, 66, 133-137. (#2)

1964

Lewis, M. Some nondecremental effects of effort. Journal of Comparative Physiological Psychology, 1964, 57, 367-372. Also in R. N. Haber (Ed.), Current research in motivation. New York: Holt, Rinehart, & Winston, 1966. (#5)

Lewis, M. The effect of effort on choice: The value of a secondary reinforcer. Psychological Reports, 1964, 16, 557-560. (#9)

Lewis, M. The effect of effort on value: An exploratory study of children. Child Development, 1964, 35, 1337-1342. (#7)

Lewis, M., Kagan, J., Zavala, F., & Grossberg, R. Behavioral and cardiac responses to auditory stimulation in the infant. American Psychologist, 1964, 19, 737 (Abstract). (#6)

Lewis, M., & Richard, S. Social encounters and their effect on subsequent social reinforcement. Journal of Abnormal and Social Psychology, 1964, 64, 253-257. (#4)

1965

Dorwart, W., Ezerman, R., Lewis, M., & Rosenhan, D. The effect of brief social deprivation on social and nonsocial reinforcement. Journal of Personality and Social Psychology, 1965, 2, 111-115. Also in H. C. Lindgren (Ed.), Contemporary research in social psychology: A book of readings. New York: Wiley, 1969. (#8)

Kagan, J., & Lewis, M. Studies of attention in the human infant. Merrill-Palmer Quarterly, 1965, 11, 95-127. (#11)

Lewis, M. The psychological effect of effort. Psychological Bulletin, 1965, 64, 183-190. (#12)

Lewis, M. Social isolation: A parametric study of its effect on social reinforcement. Journal of Experimental Child Psychology, 1965, 2, 205-218. (#10)

1966

Kagan, J., Henker, B., Hen-Tov, A., Levine, J., & Lewis, M. Infants' differential rections to familiar and distorted faces. Child Development, 1966, 37, 519-532. (#16)

Lewis, M. Probability learning in young children: The binary choice paradigm. Journal of Genetic Psychology, 1966, 108, 43-48. (#13)

Lewis, M., Kagan, J., & Kalafat, J. Patterns of fixation in infants. Child Development, 1966, 37, 331-341. (#15)

Lewis, M., Kagan, J., Kalafat, J., & Campbell, H. The cardiac response as a correlate of attention in infants. Child Development, 1966, 37, 63-71. (#14)

1967

Lewis, M. The meaning of a response or why researchers in infant behavior should be oriental metaphysicians. Merrill-Palmer Quarterly, 1967, 13(1), 7-18. (#20)

Lewis, M. Neonatal distress, measurement and prediction. Journal of the American Medical Association, 1967, 200(3), 157-158. Editorial. (#24)

Lewis, M. Reaction time and choice performance in children's binary choice behavior. Psychonomic Science, 1967, 7(10), 371-372. (#19)

Lewis, M., Bartels, B., Campbell, H., & Goldberg, S. Individual differences in attention: The relation between infants' condition at birth and attention distribution within the first year. American Journal of Diseases of Children, 1967, 113, 461-465. (#22)

Lewis, M., Bartels, B., & Goldberg, S. State as a determinant of infants' heart rate response to stimulation. Science, 1967, 155(3761), 486-488. Article reviewed in Cardiology Digest, September 1967. (#21)

Lewis, M., Goldberg, S., & Rausch, M. Attention distribution as a function of novelty and familiarity. Psychonomic Science, 1967, 7(6), 227-228. (#23)

Lewis, M., & Spaulding, S. J. Differential cardiac response to visual and auditory stimulation in the young child. Psychophysiology, 1967, 3, 229-237. (#18)

1968

Lewis, M., Rausch, M., Goldberg, S., & Dodd, C. Error, response time and IQ: Sex differences in cognitive style of preschool children. Perceptual and Motor Skills, 1968, 26, 563-568. (#26)

Steele, W. G., & Lewis, M. A longitudinal study of the cardiac response during a problem-solving task and its relationship to general cognitive function. Psychonomic Science, 1968, 11(8), 275-276. (#27)

1969

Dodd, C., & Lewis, M. The magnitude of the orienting response in children as a function of changes in color and contour. Journal of Experimental Child Psychology, 1969, 8, 296-305. (#33)

Goldberg, S., & Lewis, M. Play behavior in the year-old infant: Early sex differences. Child Development, 1969, 40, 21-31. (#32)

Lewis, M. Review of Endler, N. S., Boulter, L. R., & Osser, H. (Eds.), Contemporary issues in development psychology. New York: Holt, Rinehart, & Winston, 1968. Also in American Journal of Psychology, 1969, 82(4), 552-553. (#35)

Lewis, M. Infants' responses to facial stimuli during the first year of life. Developmental Psychology, 1969, 1, 75-86. (#31)

Lewis, M., Dodd, C., & Harwitz, M. Cardiac responsivity to tactile stimulation in waking and sleeping infants. Perceptual and Motor Skills, 1969, 29, 259-269. (#34)

Lewis, M., & Goldberg, S. The acquisition and violation of expectancy: An experimental paradigm. Journal of Experimental Child Psychology, 1969, 7, 70-80. (#29)

Lewis, M., & Goldberg, S. Perceptual-cognitive development in infancy: A generalized expectancy model as a function of the mother-infant interaction. Merrill-Palmer Quarterly, 1969, 15(1), 81-100. (#30)

Sontag, L. W., Steele, W. G., & Lewis, M. The fetal and maternal cardiac response to environmental stress. Human Development, 1969, 12(1), 1-9. (#28)

1970

Freedle, R., & Lewis, M. On relating an infant's observation time of visual stimuli with choice-theory analysis. Journal of Developmental Psychology, 1970, 2(1), 129-133. (#37)

Lewis, M., & Baumel, M. H. A study in the ordering of attention. Perceptual and Motor Skills, 1970, 31, 979-990. (#42)

Lewis, M., & Wilson, C. D. The cardiac response to a perceptual cognitive task in the young child. Psychophysiology, 1970, 6(4), 441-420. (#36)

Lewis, M., Wilson, C. D., Ban, P., & Baumel, M. H. An exploratory study of resting cardiac rate and variability from the last trimester of prenatal life through the first year of postnatal life. Child Development, 1970, 41(3), 800-811. (#38)

Lewis, M., & Wilson, L. An infant stabilimeter. Journal of Experimental Child Psychology, 1970, 10, 52-56. (#41)

1971

Lewis, M. Developmental inquiry--A credibility gap. Review of Bernard, H. W., Human development in western culture. Boston: Allyn & Bacon, 1970. Also in Contemporary Psychology, 1971, 16(3), 147-148. (#46)

Lewis, M. A developmental study of the cardiac response to stimulus onset and offset during the first year of life. Psychophysiology, 1971, 8(6), 689-698. (#44)

Lewis, M. Sex differences in cognitive style: A rejoinder. Perceptual and Motor Skills, 1971, 33, 1006. (#56)

Lewis, M., & Johnson, N. What's thrown out with the bath water: A baby? Child Development, 1971, 42(4), 1053-1055. (#53)

Lewis, M., Wilson, C. D., & Harwitz, M. H. Attention distribution in the 24-month-old child: Variations in complexity and incongruity of the human form. Child Development, 1971, 42(2), 429-438. (#52)

1972

Lewis, M. Parents and children: Sex-role development. School Review, 1972, 80(2), 229-240. (#59)

Lewis, M. Sex differences in play behavior of the very young. Journal of Health, Physical Education and Recreation, 1972, 43(6), 38-39. (#68)

Lewis, M. State as an infant-environment interaction: An analysis of mother-infant interaction as a function of sex. Merrill-Palmer Quarterly, 1972, 18, 95-121. (#45)

Lewis, M. There's no unisex in the nursery. Psychology Today, 1972, 5(12), 54-57. (#150)

Lewis, M., & McGurk, H. Evaluation of infant intelligence: Infant intelligence scores--true or false? Science, 1972, 178(4066), 1174-1177. (#67)

Lewis, M., & Wilson, C. D. Infant development in lower-class American families. *Human Development*, 1972, *15*(2), 112-127. (#47)

Lusk, D., & Lewis, M. Mother-infant interaction and infant development among the Wolof of Senegal. *Human Development*, 1972, *15*(1), 58-69. (#58)

McGurk, H., & Lewis, M. Birth order: A phenomenon in search of an explanation. *Developmental Psychology*, 1972, *7*(3), 366. (#61)

Messer, S. B., & Lewis, M. Social class and sex differences in the attachment and play behavior of the one-year-old infant. *Merrill-Palmer Quarterly*, 1972, *18*(4), 295-306. (#64)

1973

Lewis, M. Infant intelligence tests: Their use and misuse. *Human Development*, 1973, *16*, 108-118. (#77)

1974

Brooks, J., & Lewis, M. Attachment behavior in thirteen-month-old, opposite sex twins. Paper presented at the Society for Research in Child Development meetings, Philadelphia, March 1973. Also in *Child Development*, 1974, *45*, 243-247. (#80)

Brooks, J., & Lewis, M. The effect of time on attachment as measured in a free play situation. *Child Development*, 1974, *45*, 311-316. (#81)

Lewis, M., & Ban, P. Mothers and fathers, girls and boys: Attachment behavior in the one-year-old. Paper presented at the Eastern Psychological Association Meetings, New York, April 1971. Also in *Merrill-Palmer Quarterly*, 1974, *20*(3), 195-204. (#49, #71)

McGurk, H., & Lewis, M. Space perception in early infancy: Perception within a common auditory-visual space? *Science*, 1974, *186*(4164), 649-650. (#91)

Yoshida, R. K., Lewis, M., Schimpler, S., Ackerman, J. Z., Driscoll, J., & Koenigsberger, M. R. The distribution of attention within a group of infants "at risk." Research Bulletin 74-41, Princeton, N.J.: Educational Testing Service, 1974. (#94)

1975

Lewis, M. Early sex differences in the human: Studies of socioemotional development. *Archives of Sexual Behavior*, 1975, *4*(4). Also in E. A. Rubinstein, R. Green, & E. Brecher, *New directions in sex research*. New York: Plenum, 1975. (#119)

Brooks, J., & Lewis, M. Infants' social responses to social events. Research Bulletin 75-2. Princeton, N.J.: Educational Testing Service, 1975. Also appears as Infants' responses to strangers: Midget, adult and child. *Child Development*, 1976, *47*, 323-332. (#99)

Cherry, L., & Lewis, M. Mothers and two-year-olds: A study of sex-differentiated aspects of verbal interaction. Paper presented at the Third International Child Language Symposium, London, England, September 1975. Research Bulletin 75-37. Princeton, N.J.: Educational Testing Service, 1975. Also in *Developmental Psychology*, 1976, *12*(4), 278-282. (#127)

1976

Lewis, M. A theory of conversation. *The Quarterly Newsletter* of the Institute for Comparative Human Development. New York: The Rockefeller University, September 1976, *1*, 1. (#154)

1977

Lewis, M. The busy, purposeful world of a baby. *Psychology Today*, February 1977. (#149)

Lewis, M. A new response to stimuli. *The Science*, May/June 1977, *17*, 3. (#152)

Lewis, M. Early socioemotional development and its relevance for curriculum. Invited address for the American Educational Research Association meetings, San Francisco, April 1976. Also in *Merrill-Palmer Quarterly*, 1977, *23*(4), 279-286. (#133)

Weinraub, M., Brooks, J., & Lewis, M. The social network: A reconsideration of the concept of attachment. *Human Development*, 1977, *20*, 31-47. (#97)

Zarin-Ackerman, J., Lewis, M., & Driscoll, J. Language development in two-year-old normal and risk infants. *Pediatrics*, 1977, *59*, 6 (supplement), 982. (#117)

1978

Feiring, C., & Lewis, M. The child as a member of the family system. *Behavioral Science*, 1978, *23*, 225-233. (#194)

Lewis, M. Attention and verbal labeling behavior: A study of the measurement of internal representations. *The Journal of Genetic Psychology*, 1978, *133*, 191-202. (#40, #164)

Lewis, M. The infant and its caregiver: The role of contingency. Paper presented at a conference on Infant Intervention Programs, The University of Wisconsin, Milwaukee, June 1977. Also in *Allied Health and Behavioral Sciences*, 1978, *1*(4), 469-492. (#170)

Lewis, M. Social knowledge and mental acts. (Review of linguistically-mediated tool use and exchange by chimpanzees, Pan Troglodytes, E. S. Savage-Rumbaugh, D. M. Rumbaugh, & S. Boysen; Does the chimpanzee have a theory of mind?, D. Premack & G. Woodruff; Prospects for a cognitive ethology, D. R. Griffin). The Behavioral and Brain Sciences (Special Issue on Cognition & Consciousness in Nonhuman Species), 1978, 4, 580-581. (#202)

1979

Brooks-Gunn, J., & Lewis, M. The effects of age and sex on infants' playroom behavior. Journal of Genetic Psychology, 1979, 134, 99-105. (#171)

Brooks-Gunn, J., & Lewis, M. "Why Mama and Papa?" The development of social labels. Child Development, 1979, 50, 1203-1206. (#198)

Feiring, C., & Lewis, M. Sex and age differences in young children's reactions to frustration: A further look at the Goldberg and Lewis (1969) subjects. Child Development, 1979, 50, 848-853. (#184)

Lewis, M. Cognitive factors in attachment. (Review of Toward a general theory of infantile attachment: A comparative review of aspects of the social bond, D. W. Rajeck, M. E. Lamb, & P. Obmascher). The Behavioral and Brain Sciences, 1979, 2(4), p. 640. (#201)

Lewis, M. The self as a developmental concept. Human Development, 1979, 22, 416-419. (#200)

Lewis, M., & Kreitzberg, V. The effects of birth order and spacing on mother-infant interactions. Developmental Psychology, 1979, 15(6), 617-625. (#177)

Lewis, M., & Weinraub, M. Origins of early sex-role development. Sex Roles, 1979, 5(2), 135-153. (#195)

Young, G., & Lewis, M. Effects of familiarity and maternal attention on infant peer relations. Merrill-Palmer Quarterly, 1979, 25(2), 105-119. (#193)

1980

Feiring, C., & Lewis, M. Temperament: Sex differences and stability in vigor, activity and persistence in the first three years of life. Journal of Genetic Psychology, 1980, 136, 65-75. (#183)

Lewis, M. Peer interaction and maltreated children: Social network and epigenetic models. Infant Mental Health Journal, 1980, 1(4). (#230)

Lewis, M., & Coates, D. L. Mother-infant interactions and cognitive development in twelve-week-old infants. Infant Behavior and Development, 1980, 3, 95-105. (#213)

1981

Brooks-Gunn, J., & Lewis, M. Assessing the handicapped young: Issues and solutions. *Journal of the Division for Early Childhood*, 1981. (#241)

Brooks-Gunn, J., & Lewis, M. Infant social perception: Responses to pictures of parents and strangers. *Developmental Psychology*, 1981, *17*(5), 647-649. (#215)

Lewis, M., & Brooks-Gunn, J. Attention and intelligence. *Intelligence*, 1981, *5*(3), 231-238. (#245)

Lewis, M., & Brooks-Gunn, J. Visual attention at three months as a predictor of cognitive functioning at two years of age. *Intelligence*, 1981, *5*, 131-140. (#144)

In Press

Brinker, R., & Lewis, M. Discovering the competent handicapped infant: A process approach to assessment and intervention. To appear in *Topics in Early Childhood Special Education*, 1982, *2*(2), in press. (#300)

Brooks-Gunn, J., & Lewis, M. The development of early visual self-recognition. *Developmental Review*, 1982, in press. (#288)

Brooks-Gunn, J., & Lewis, M. Play in handicapped infants and their mothers. *Topics in Special Education*, in press. (#281)

Fox, N., & Lewis, M. Motor asymmetries in preterm infants: Effects of prematurity and illness. *Developmental Psychobiology*, 1982, *14*, in press. (#264)

Leifer, J., & Lewis, M. Maternal speech to normal and handicapped children: A look at question-asking behavior. *Infant Behavior Development*, in press. (#249)

Lewis, M. Play as whimsy. *Human Brain & Behavior*, 1981, in press. (#271)

Lewis, M., & Jaskir, J. Infant intelligence and its relationship to birth order and birth spacing. *Infant Behavior & Development*, in press. (#250)

Wasserman, G., & Lewis, M. "Situations and situation transitions in maternal-infant interactive behavior." *Journal of Genetic Psychology*, in press. (#285)

In Preparation

Lewis, M., & Brinker, R. Role of early environmental contingencies in development. To appear in the *American Journal of Orthopsychiatry*, 1981. In preparation. (#274)

Submitted for Publication

Brinker, R., & Lewis, M. Making the world work with microcomputers: A learning prosthesis for handicapped infants. Submitted for publication. (#299)

Coates, D., & Lewis, M. Early mother-infant interaction and infant cognitive status as predictors of school performance and cognitive behavior in 6 year olds. Submitted for publication. (#272)

Feinman, S., Feldman, N. S., & Lewis, M. Volunteering one's infant for a study: A suggestion for the unobtrusive consideration of parental attitudes. Submitted for publication. (#247)

Feinman, S., & Lewis M. Social referencing and second order effects in ten-month-old infants. Paper presented at the Society for Research in Child Development meetings, Boston, Massachusetts, 1981. Submitted for publication. (#256)

Feinman, S., & Lewis, M. Working and nonworking mothers' influence on infants' responses to a stranger. Submitted for publication. (#284)

Feiring, C., Lewis, M., & Starr, M. Indirect effects and the child's reaction to strangers. Submitted for publication. (#219)

Fox, N., & Lewis, M. Auditory attention in three month preterm infants. Submitted for publication. (#292)

Fox, N., & Lewis, M. Hemispheric specialization for speech sounds: Term and preterm infant comparisons. Submitted for publication. (#237)

Fox, N., & Lewis, M. Prematurity, illness, and experience: Factors for early experimentation. Submitted for publication. (#264)

Fox, N., & Lewis, M. Three-month-old infants' response to face-voice violation. Submitted for publication. (#248)

Lewis, M., & Enright, M. Development of intellectual abilities in the first three years of life. Submitted for publication. (#226)

Lewis, M., & Michalson, L. Toy play as a function of familiarity, preference, and complexity. Submitted for publication. (#268)

Lewis, M., & Sullivan, M. Imitation in the first six months of life: Phenomenon in the eye of the beholder. Submitted for publication. (#294)

Wasserman, G., & Lewis, M. Sex differences as a function of ecological factors. Submitted for publication. (#286)

Presented Papers

1966

Lewis, M., Bartels, B., Fadel, D., & Campbell, H. Infant attention: The effect of familiar and novel visual stimuli as a function of age. Paper presented at the Eastern Psychological Association meetings, New York, April 1966. (#17)

1971

Lewis, M. Infants are people, too! Paper presented at a Symposium on New Considerations in Early Childhood Development at the National Conference on Social Welfare, 1971. (#55)

Lewis, M. Learning to learn in infancy: The development of competence motivation. Paper presented for the Select Education Subcommittee of the Education and Labor Committee of the House of Representatives, 1971. (#54)

Lewis, M., & Ban, P. Stability of attachment behavior: A transformational analysis. Paper presented at a Symposium on Attachment: Studies in Stability and Change at the Society for Research in Child Development meetings, Minneapolis, April 1971. (#48)

Lewis, M., & Groch, A. Cardiac response to visual and auditory stimulation in the first two years of life. Paper presented at the Society for Psychophysiological Research meetings, St. Louis, October 1971. (#57)

Wilson, C. D., & Lewis, M. A developmental study of attention: A multi-variate approach. Paper presented at the Eastern Psychological Association meetings, New York, April 1971. Also in Research Bulletin 72-31. Princeton, N.J.: Educational Testing Service, 1972. (#50)

1972

Freedle, R., & Lewis, M. Applications of Markov processes to vacalization states. Paper presented at meetings of the Psychometric Society, Princeton, March 1972. (#60)

Lewis, M. The measurement of individual differences in central nervous system functioning. Paper presented at the 3rd meeting of the Perinatal Society, Asilomar, California, September 1972. (#70)

Lewis, M., & Scott, E. A developmental study of infant attentional distribution within the first two years of life. Paper presented at a Symposium on Learning in Early Infancy, at the XXth International Congress of Psychology, Tokyo, Japan, August 1972. (#69)

1973

Lewis, M. Designing environments for development. Paper presented at the Biennial Meeting of the International Society for the Study of Behavioral Development, Ann Arbor, August 1973. (#86)

Lewis, M., Weinraub, M., & Ban, P. Mothers and fathers, girls and boys: Attachment behavior in the first two years of life. Paper presented at the Society for Research in Child Development meetings, Philadelphia, March 1973. (#78)

Scott, E., & Lewis, M. Developmental changes in response recovery. Paper presented at the Society for Psychophysiological Research meetings, Galveston, Texas, October 1973. (#88)

1974

Brooks, J., & Lewis, M. Infants' responses to pictures of self, mother and other. Paper presented at the Eastern Psychological Association meetings, Philadelphia, April 1974. (#100)

Lee-Painter, S., & Lewis, M. Mother-infant interaction and cognitive development. Paper presented at the Eastern Psychological Association meetings, Philadelphia, April 1974. (#101)

Lewis, M. Newborn infant behavior as an indicator for future intellectual functioning. Presented at a Conference on Obstetrical Management and Infant Outcome: Implications for Future Mental and Physical Development, March 1974. (#92)

Lewis, M., Townes-Rosenwein, L., & McGurk, H. Normal and discrepant face-voice integration in early infancy. Paper presented at the Eastern Psychological Association meetings, Philadelphia, April 1974. Also ETS Research Bulletin 74-4. Princeton, N.J.: Educational Testing Service, 1974. (#89)

Scott, E., & Lewis, M. A longitudinal study of attention and cognition in the first two years of life. Paper presented at the Eastern Psychological Association meetings, Philadelphia, April 1974. (#102)

Weinraub, M., & Lewis, M. Maternal verbalization as a determinant of separation distress in the two-year-old child. Paper presented at the Eastern Psychological Association meetings, Philadelphia, April 1974. (#103)

1975

Als, H., & Lewis, M. The contribution of the infant to the interaction with his mother. Paper presented at a Symposium on the Direction of Effects in Studies of Early Parent-Infant Interaction at the Society for Research in Child Development Meetings, New York City, April 1975. (#107)

Barker, B., & Lewis, M. A multidimensional analysis of the effect of birth order on mother-infant interaction. Paper presented at the Eastern Psychological Association meetings, New York City, April 1975. (#108)

Brooks, J., & Lewis, M. Person perception and verbal labeling: The development of social labels. A version of this paper was presented at both the Society for Research in Child Development meetings, Denver, April 1975 and the Eastern Psychological Association meetings, New York City, April 1975. (#110)

Cherry, L., & Lewis, M. Teacher-child interaction: Sex differences in conversation. Paper presented at the Eastern Psychological Association meetings, New York City, April 1975. (#122)

Haviland, J., & Lewis, M. Infants' greeting patterns to strangers. Paper presented at the Human Ethology session of the Animal Behavior Society meeting, Wilmington, North Carolina, May 1975. (#125)

Judd, E., & Lewis, M. Mother-infant dyads: Early sex differences. Paper presented at the Eastern Psychological Association meetings, New York City, April 1975. (#111)

Lewis, M. The meaning of fear. Paper presented at a Symposium on the Origins of Joy and Fear: The development of Affect Systems in Infancy at the Society of Research in Child Development meetings, Denver, April 1975. (#112)

Lewis, M., & Haviland, J. Social responses to social objects: Infant fear or infant greeting? Invited plenary address at the XIVth International Ethological Conference, Parma, Italy, August-September 1975. (#126)

Lewis, M., & Young, G. The infant's social network: The relationship between attachment and infant-peer interaction. Paper presented at the Human Ethology meetings, Sheffield, England, July 1975. (#120)

Lord, S., Lewis, M., & Brooks, J. Person perception: Infants' responses to pictures. Paper presented at the Eastern Psychological Association meetings, New York City, April 1975. (#113)

Michalson, L., Brooks, J., & Lewis, M. Peers, parents, people: Social relationships in infancy. Paper presented at the Eastern Psychological Association Meetings, New York City, April 1975. (#114)

Weinraub, M., & Lewis, M. The determinants of separation distress. A path analysis model. Paper presented at the Eastern Psychological Association meetings, New York City, April 1975. (#115)

Young, G., & Lewis, M. Friends and strangers: Peer relations in infancy. Paper presented at the Human Ethology session of the Animal Behavior Society meeting, Wilmington, North Carolina, May 1975. (#124)

Zarin-Ackerman, J., & Lewis, M. The relationship of maternal and infant behavior at three months of age to infant behavior at one year. Paper presented at the Eastern Psychological Association meetings, New York City, April 1975. (#116)

Zarin-Ackerman, J., Lewis, M., & Driscoll, J. Patterns of visual fixation in the sick, premature infant: A longitudinal study of the first two years of life. A version of this paper was presented at both the Society for Research in Child Development meetings, Denver, April 1975 and at the Society for Perinatal Research meeting, Denver, April 1975. (#118)

1976

Brooks, J., & Lewis, M. Visual self-recognition in different representational forms. Paper presented at the XXIst International Congress, Paris, July 1976. (#147)

Brooks, J., & Lewis, M. Visual self-recognition in infancy: Contingency and the self-other distinction. Paper presented at the Southeastern Conference on Human Development meetings, Nashville, April 1976. (#135)

Gallas, H., & Lewis, M. Cognitive performance in the 12-week-old infant: The effects of birth order, birth spacing, sex, and social class. Paper presented at the Eastern Psychological Association meetings, New York, April 1976. (#136)

Judd, E., & Lewis, M. The effects of birth order and spacing on mother-infant relationships. Paper presented at the Eastern Psychological Association meetings, New York, April 1976. (#137)

Lewis, M. The effect of birth order on the mother-child relationship. Progress report prepared for the National Institute of Child Health and Human Development, 1976. (#153)

Lewis, M. The origins of self competence. Paper presented at the NIMH Conference on Mood Development, Washington, D. C., November 1976. (#151)

Lewis, M. The study of the consequences of perinatal problems. Paper prepared for the Georgia Warm Springs Conference, Princeton, N.J., September 1976. (#148)

Lewis, M. What is natural? Paper presented at New York Academy of Science, New York, New York, October 1976. (#257)

Lewis, M., & Brooks, J. Social perception in infancy. Paper presented in a Symposium on Infant Perception at the XXIst International Congress of Psychology, Paris, July 1976. (#146)

Lord, S., & Lewis, M. Response decrement and recovery in the 12-week-old infant The effects of birth order, sex and social class. Paper presented at the Eastern Psychological Association meetings, New York, April 1976. (#138)

1977

Coates, D. L., & Lewis, M. Social class and ethnicity differences in early mother-infant interactions. Paper presented at the annual meeting of the American Educational Research Association, New York, April 1977. (#168)

Gallas, H., & Lewis, M. Gender differences in the relationship between mother-infant interaction and the infant's cognitive development. Paper presented at the Eastern Psychological Association meetings, Boston, April 1977. (#167)

Gallas, H., & Lewis, M. Mother-infant interaction and cognitive development in the 12-week-old infant. Paper presented at the Society for Research in Child Development meetings, New Orleans, March 1977. (#165)

Lewis, M. The child's social world: The relationship between social objects and functions. Paper presented at the International Society for the Study of Behavioral Development meeting, Pavia, Italy, September 1977. (#176)

Waite, L. H., & Lewis, M. Intermodal person schema in infancy: Perception within a common auditory-visual space. Paper presented at the Eastern Psychological Association meetings, Boston, April 1977. (#166)

1978

Feiring, C., & Lewis, M. Temperament: Individual consistency in vigor, activity, and persistence in the first three years of life. Paper presented at the Eastern Psychological Association meetings, Washington, D. C., April, 1978. (#297)

Hawryluk, M. K., & Lewis, M. Attentional patterns in infants with Down's syndrome: A preliminary investigation. Paper presented at the Eastern Psychological Association meetings, Washington, D. C., April, 1978. (#187)

Kreitzberg, V., & Lewis, M. A factor analytic study of the Bayley Mental Scale of Infant Development. Paper presented at the Eastern Psychological Association meetings, Washington, D.C., April 1978. (#190)

Leifer, J. S., & Lewis, M. Maternal question-asking behavior: A longitudinal analysis. Paper presented at the Eastern Psychological Association meetings, Washington, D. C., April 1978. (#189)

Leifer, J. S., & Lewis, M. Responding to questions: A longitudinal analysis. Paper presented at the summer meeting of the Linguistic Society of America, Urbana-Champaign, Illinois, July 1978. (#243)

Lord, S., & Lewis, M. Sex and social class differences in infant play behavior. Paper presented at the Eastern Psychological Association meetings, Washington, D. C., April 1978. (#188)

Waite, L. H., & Lewis, M. Maternal report on social imitation development during the first year. Paper presented at the Eighth Annual Symposium of the Piaget Society, Philadelphia, May 1978. (#191)

1979

Brooks-Gunn, J., & Lewis, M. Handicapped infants and their others at play. Paper presented at a Symposium on Handicapped Infants and Their Mothers at the American Psychological Association meetings, New York, September 1979. (#221)

Feiring, C., & Lewis, M. Changing characteristics of the U.S. family: Implications for family relationship and child development. Paper presented at the Ira J. Gordon Memorial Conference on Parent Education and Involvement, University of North Carolina, Chapel Hill, June 1979. (#186)

Fox, N., Miner, C., Brandt, L., & Lewis, M. The mother-infant dyad: A review of developmental research and presentation of a scheme for qualitative evaluation of the dyad. Paper presented at the meetings of the American Academy of Child Psychiatry, Atlanta, Georgia, October 29, 1979. (#253)

Gaffuri, A. M., & Lewis, M. How mothers leave their infants: Developmental changes in departure style. Paper presented at the Eastern Psychological Association meetings, Philadelphia, April 1979. (#207)

Leifer, J., & Lewis, M. The maternal response component: Mothers' linguistic behaviors following child responses. Paper presented at the Eastern Psychological Association meetings, Philadelphia, April 1979. (#209)

Lewis, M. Changing characteristics of the U. S. family: Implications for family relationships and child development. Paper presented at a workshop at the Canadian Association for Young Children's meetings, Ottawa, Canada, October 26, 1979. (#205)

Lewis, M. Developmental principles and educational practice. Paper presented at the invited 1979 Pickering Lecture sponsored by the Department of Psychology, Carleton University, Ottawa, Canada, October 26, 1979. (#225)

Lewis, M. Issues in the study of imitation. Paper presented at a Symposium, Imitations in Infancy: What, When and How at the Society for Research in Child Development meetings, San Francisco, March 1979. Also in ERIC's Resources in Education (RIE), #ED 171 394, October 1979. (#203)

Lewis, M. Self knowledge, gender identity, and sex role development. Paper presented as a Masters' Lecture at the American Psychological Association meetings, New York, September 4, 1979. (#217)

Lewis, M. The social network: Toward a theory of social development. Fiftieth Anniversary invited address, Eastern Psychological Association meetings, Philadelphia, April 1979. (#206)

Schwartz, W., & Lewis, M. Infant intelligence and its relation to birth order and birth spacing. Paper presented at the Eastern Psychological Association meetings, Philadelphia, April 1979. (#208)

Waite, I. H., & Lewis, M. Early imitation with several models: An example of socio-affective development. Paper presented at the Society for Research in Child Development meetings, San Francisco, March 1979. (#204)

1980

Brooks-Gunn, J., & Lewis, M. The relationship of social and cognitive development in Down's syndrome infants. Paper presented at a Symposium on Social and Cognitive Development in Down's Syndrome Infants at the International Conference on Infant Studies, New Haven, Connecticut, April 1980. (#233)

Coates, D. L., & Lewis, M. Relationships between cognitive behavior at six years and mother-infant interaction at three months. Paper presented at the International Conference on Infant Studies, New Haven, Connecticut, April 1980. (#235)

Feiring, C., & Lewis, M. Children, parents, and siblings: Possible sources of variation in the behavior of first born and only children. Paper presented at a symposium on The Cognitive and Social Consequences of Growing Up Without Siblings at the meetings of the American Psychological Association, Montreal, Canada, September 1980. (#242)

Feiring, C., & Lewis, M. First born and only children and their mothers. Paper presented at symposium on only children, American Psychological Association, Montreal, 1980. (#298)

Fox, N., & Lewis, M. Lateral differences in preterm infant responsiveness and hemispheric specialization for language. Paper presented at the meetings of the International Neuropsychological Society, January, 1980. (#293)

Leifer, J., & Lewis, M. Maternal speech to normal and handicapped children: A look at question-asking behavior. Paper presented at The International Conference on Infant Studies, New Haven, Connecticut, April 1980. (#234)

Lewis, M., & Brooks-Gunn, J. Logical problems in research with exceptional children. Paper presented at a Symposium on Social and Cognitive Development in Down's Syndrome Infants at the International Conference on Infant Studies, New Haven, Connecticut, April 1980. (#232)

1981

Brinker, R., & Lewis, M. Intervening in the motivational systems of handicapped infants: A process approach with product implications. Paper presented at 59th Annual Convention of the Council on Exceptional Children, New York, April 1981. (#275)

Brinker, R., & Lewis, M. Patterns of learning by handicapped infants. Paper presented at the biennial convention of the Society for Research in Child Development, Boston, April 1981. (#290)

Brooks-Gunn, J., & Lewis, M. Temperament Characteristics of Atypical Infants. Paper presented at the Society for Research in Child Development meetings, Boston, Mass., April, 1981. Submitted for publication. (#277)

Feiring, C., & Lewis, M. The birth of a sibling: Effects on the mother-first born child interaction. Paper presented at a Symposium, The Effect of Siblings on Child Development at the Society for Research in Child Development meetings, Boston, Mass., Boston, April 1981. (#266)

Feiring, C. & Lewis, M. The social network of 3-year-old children. Paper presented at Society for Research in Child Development meetings, Boston, Mass., April 1981. (#265)

Hartka, E., Brooks-Gunn, J., & Lewis, M. Age changes in contingent learning. Paper presented at the Eastern Psychological Association meetings, New York, April 1981. (#258)

Jaskir, J., & Lewis, M. A factor analytic study of mother-infant interaction at 3, 12, and 24 months. Paper presented at the Eastern Psychological Association meetings, New York, April 1981. (#262)

Lewis, M., & Wehren, A. The tyranny of the central tendency and other problems in studying the handicapped child. Paper presented at the Symposium, Conceptual and Methodological Issues in the Study of At-Risk and Handicapped Young Children. Society for Research in Child Development biennial meeting, Boston, Mass., April 1981. (#261)

Michalson, L., & Lewis, M. A cross-cultural study of parent expectations about infant development. Paper presented at the Eastern Psychological Association meetings, New York, April 1981. (#259)

Wehren, A., & Lewis, M. Implicit rule systems in developmental research. Paper presented at the Eastern Psychological Association meetings, New York, April 1981. (#260)

Weistuch, L., & Lewis, M. Age as a social cognition. Paper presented at the Eastern Psychological Association meetings, New York, April 1981. (#263)

1982

Brooks-Gunn, J., Lewis, M., & Bendersky, M. Heart rate variability and attention in handicapped and normal infants. Paper presented at the International Conference on Infant Studies, Austin, Texas, March 1982. (#302)

Lewis, M., & Brooks-Gunn, J. Antecedents of visual self recognition in infancy. Paper presented at the International Conference on Infant Studies, Austin, Texas, March 1982. (#305)

Lewis, M., & Michalson, L. From emotional state to emotional expression. Paper presented at the Symposium on Human Development in the Perspective of Person and Environment Interactions, University of Stockholm, Sweden, July-July, 1982. (#303)

In Preparation

Lewis, M., & Feiring, C. Attachment and social network. Paper in preparation. (#280)

Unpublished Manuscripts

1972

Lewis, M., & Lee-Painter, S. Mother-infant interaction scales. Princeton, N.J.: Educational Testing Service, 1972. (#106)

1973

Lewis, M., McGurk, J., Scott, E., & Groch, A. Infants' attentional distribution across two modalities. Unpublished manuscript, 1973. (#73)

Weinraub, M., & Lewis, M. Infant attachment and play behavior: Sex of child and sex of parent differences. Unpublished manuscript, 1973. (#85)

1974

Brooks, J., Lewis, M., & Michalson, L. Infants' playroom behavior: Responses to mother, adults, and peers. Unpublished manuscript, 1974. (#130)

1978

Lewis, M., & Cherry, L. Development and change in conversation and linguistic skill. Unpublished manuscript, 1978. (#162)

Wasserman, G. A., & Lewis, M. The effects of situations and situation transitions on maternal and infant behavior. Unpublished manuscript, 1978. (#192)

1980

Bennett, R. E., & Lewis, M. Assessing the assessors: A necessary and important training function. Unpublished manuscript, 1980. (#214)

1981

Lewis, M., Edwards, D. P., Weistuch, L., & Cortelyou, S. Age as a Social Cognition. Unpublished manuscript, 1981. (#255)

JEANNE BROOKS-GUNN

VITAE

Address:

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St. Luke's-Roosevelt Hospital Center
428 West 59th Street
New York, New York 10019

Birthdate: December 9, 1946

Education:

B.A.	Connecticut College, 1969	Major:	Psychology
Ed.M.	Harvard University, 1970	Major:	Human Learning & Development
Ph.D.	University of Pennsylvania, 1975	Major:	Human Learning & Development

Employment: Research

1978-	Research Scientist, Center for Assessment and Research in Human Development, Educational Testing Service
1977-	Associate Director, Institute for the Study of Exceptional Children, Educational Testing Service
1977-	Research Scientist, The Pediatric Service, St. Luke's-Roosevelt Medical Center, New York City
1974-1977	Associate Research Scientist, Institute for Research in Human Development, Educational Testing Service

Employment: Teaching

1981-	Adjunct Faculty, Department of Psychology, Princeton University
1978-	Assistant Professor of Clinical Pediatric Psychology, College of Physicians & Surgeons, Columbia University
1978-1980	Adjunct Faculty, Penn Women Studies Program, University of Pennsylvania
1973-1977	Adjunct Assistant Professor, College of Arts & Sciences, University of Pennsylvania
1971-1972	Lecturer, Graduate School of Education, University of Pennsylvania

Grants Received:

1981-1982	Promotion of Child Health and Development. The Commonwealth Fund.
1980-1981	Maternal Androgyny and Mother-Child Interaction. Biomedical Funds, National Institute of Health.
1980-1981	Conference on Female Puberty. Johnson and Johnson Company.
1977-1982	Institute for the Study of Exceptional Children. Bureau for the Education of the Handicapped.
1976-1979	The Handicapped Infant: Skill Assessment and Evaluation. Bureau for the Education of the Handicapped.
1976-1978	Social Determinants of Menstrual-Related Attitudes and Behaviors. National Science Foundation.
1973-1976	The Development of Visual Self-Recognition in Infancy. National Institute of Mental Health.
1973-1974	Social Perception and Peer Group Interaction in Infancy. National Institute of Education.

Academic Honors:

Phi Delta Kappa Dissertation Award
Phi Lambda Theta
Phi Delta Kappa
Honors and Thesis Sponsorship in Undergraduate Major

Professional Memberships:

American Education Research Association
American Psychological Association
Eastern Psychological Association
New York Academy of Sciences
Society for Research in Child Development
American Association for the Advancement of Science

Other Professional Activities:

1979-	Board of Trustees, New Jersey Neuropsychiatric Institute (State of New Jersey Mental Retardation Institution).
1981-	Aspen Institute participant, "The First 20 Years of Life Project," sponsored by The Aspen Institute and the Foundation for Child Development.
1978-	Reviewer, Child Development, Developmental Psychology, Science, Psychological Bulletin, Journal of Applied Developmental Psychology, Psychology of Women Quarterly, Sex Roles.
1978-	Reviewer, American Psychological Association, Society for Research in Child Development, Southeastern Conference of Child Development.
1981-	Program Chair, International Conference for Infancy Studies.

Consulting:

1980-	The Commonwealth Fund
1981-	The Robert Wood Johnson Foundation
1981-	Panel on the Promotion of Child Health, Institute of Medicine, National Academy of Sciences
1981-	The National Evaluation of the WIC Nutritional Program, U.S. Department of Agriculture & Columbia University

Honors:

1979-	Who's Who in American Women
1981-	International Who's Who in American Women

JEANNE BROOKS-GUNN

PUBLICATIONS

BOOKS

Brooks-Gunn, J., & Matthews, W. He and she: How children develop their sex-role identity. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1979.

Lewis, M., & Brooks-Gunn, J. Social cognition and the acquisition of self. New York: Plenum, 1979.

Lewis, M., & Brooks-Gunn, J. The handicapped infant. New York: McGraw-Hill 1982, in press.

Brooks-Gunn, J., & Petersen, A. (Eds.). Girls at Puberty: Biological and Psychosocial Perspectives. New York: Plenum, 1982, in press.

ARTICLES AND CHAPTERS

1. Brooks, J., & Lewis, M. Attachment behavior in thirteen-month-old, opposite-sex twins. Child Development, 1974, 45, 243-247.
2. Brooks, J., & Lewis, M. The effect of time on attachment as measured in a free play situation. Child Development, 1974, 45, 311-316.
3. Lewis, M., & Brooks, J. Self, other, and fear: Infants' reactions to people. In M. Lewis & L. Rosenblum (Eds.), The origins of fear: The origins of behavior, (Vol.2). New York: John Wiley & Sons, Inc., 1974, 195-227.
4. Lewis, M., & Brooks, J. Infants' social perception: A constructivist view. In L. Cohen & P. Salapetek (Eds.), Infant perception: From sensation to cognition, (Vol.2). New York: Academic Press, Inc., 1975, 101-143.
5. Lewis, M., Young, G., Brooks, J., & Michalson, L. The beginning of friendship. In M. Lewis & L. Rosenblum (Eds.), Friendship and peer relations: The origins of behavior, (Vol. 4). New York: John Wiley & Sons, Inc., 1975, 27-66.
6. Brooks, J., & Lewis, M. Infants' responses to strangers: Midget, adult, and child. Child Development, 1976, 4, 323-332.
7. Brooks, J., & Weinraub, M. History of infant intelligence tests. In M. Lewis (Ed.), Infant intelligence. New York: Plenum Press, 1976, 19-58.
8. Brooks, J., Ruble, D. N., & Clarke, A. College women's attitudes and expectations concerning menstrual-related changes. Psychosomatic Medicine, 1977, 39, 288-298.
9. Weinraub, M., Brooks, J., & Lewis, M. The social network: A reconsideration of the concept of attachment. Human Development, 1977, 20, 31-47.

PUBLICATIONS

ARTICLES AND CHAPTERS (continued)

10. Lewis, M., & Brooks, J. Self-knowledge and emotional development. In M. Lewis & L. Rosenblum (Eds.), The development of affect: The genesis of behavior, (Vol.1). New York: Plenum Press, 1978, 205-226.

11. Lewis, M., Brooks, J., & Haviland, J. Heats and faces: A study in the measurement of emotion. In M. Lewis & L. Rosenblum (Eds.), The development of affect: The genesis of behavior, (Vol. 1). New York: Plenum Press, 1978, 77-123.

12. Brooks-Gunn, J., & Lewis, M. Early social knowledge: The development of knowledge about others. In H. McGurk (Ed.), Childhood social development. London: Methuen, 1978, 79-106.

13. Ruble, D., & Brooks-Gunn, J. Menstrual myths. Medical Aspects of Human Sexuality, June 1979, 110-115.

14. Brooks-Gunn, J., & Lewis M. The effect of age and sex on infants' playroom behavior. Journal of Genetic Psychology, 1979, 134, 99-105.

15. Brooks-Gunn, J., & Lewis, M. "Why Mama and Papa?" The development of social labels. Child Development, 1979, 50, 1203-1206.

16. Lewis, M., & Brooks-Gunn, J. The search for the origins of self: Implications for social behavior and intervention. In L. Montada (Ed.), Brennpunkte der entwicklungspsychologie. Stuttgart: W. Kohlhammer, Gmbh., 1979, 157-172.

17. Lewis, M., & Brooks-Gunn, J. Toward a theory of social cognition: The development of self. In I. Uzgiris (Ed.), New directions in child development: Social interaction and communication during infancy. San Francisco: Jossey-Bass, 1979.

18. Ruble, D., & Brooks-Gunn, J. Menstrual symptoms: A social cognitive analysis. Journal of Behavioral Medicine, 1979, 2, 171-194.

19. Brooks-Gunn, J., & Fisch, M. Psychological androgyny and college students' judgments of mental health. Sex Roles, 1980, 6(4), 575-580.

20. Brooks-Gunn, J., & Ruble, D. Menarche: The interaction of physiology, cultural, and social factors. In A. J. Dan, E. A. Graham & C. P. Beecher (Eds.), The menstrual cycle: A synthesis of interdisciplinary research. New York: Springer, 1980, 141-159.

21. Ruble, D., Brooks-Gunn, J., & Clarke, A. Research on menstrual-related psychological changes: Alternative perspectives. In J. E. Parsons (Ed.), The psychobiology of sex differences and sex roles. Washington, D.C.: Hemisphere, 1980, 227-244.

JEANNE BROOKS-GUNN

PUBLICATIONS

ARTICLES AND CHAPTERS (continued)

22. Brooks-Gunn, J., & Ruble, D. The Menstrual Attitude Questionnaire. Psychosomatic Medicine, 1980, 42(5), 503-512.

23. Lewis, M., & Brooks-Gunn, J. Visual attention at three months as a predictor of cognitive functioning at one and two years. Intelligence, 1981, 5(2), 131-140.

24. Lewis, M., & Brooks-Gunn, J. Attention and intelligence. Intelligence, 1981, 5(3).

25. Brooks-Gunn, J., & Lewis, M. Assessing the handicapped young: Issues and solutions. Journal of the Division for Early Childhood, 1981.

26. Ruble, D., Boggiano, A., & Brooks-Gunn, J. Men's and women's evaluation of menstrual-related excuses. Sex Roles, in press.

27. Ruble, D., & Brooks-Gunn, J. Expectations regarding menstrual symptoms: Effects on evaluations and behavior of women. In A. Voda & M. Dinnerstein (Eds.), Changing perspectives on menopause. Austin: University of Texas Press, in press.

28. Brooks-Gunn, J. Methods and models of menstrual research: A sociocultural approach. In A. Voda & M. Dinnerstein (Eds.), Changing perspectives on menopause. Austin: University of Texas Press, in press.

29. Brooks-Gunn, J., & Ruble, D. N. Menarche: Fact and Fiction. In N. Woods, G. C. Hongtadarum & R. McCorrle (Eds.), Women's Health. Englewood Cliffs, New Jersey: Prentice Hall, 1982.

30. Brooks-Gunn, J., & Ruble, D. N. Developmental processes in the experience of menarche. In A. Baum & J. E. Singer (Eds.), Handbook of Medical Psychology, (Vol. 1), in press.

31. Brooks-Gunn, J., & Lewis, M. The development of the self. In C. Kopp & N. Krokaw (Eds.), Developmental Psychology. Reading, Massachusetts: Addison-Wesley, in press.

32. Brooks-Gunn, J., & Lewis, M. Mirror-image stimulation and self-recognition in infancy. In L. Steinberg (Ed.), The life span: Readings in human development, New York: Columbia University Press, 1982.

33. Lewis, M., & Brooks-Gunn, J. Self, other, and fear: The reaction of infants to people. In J. Belsky (Ed.), In the beginning: Readings in infancy. New York: Columbia University Press, 1982.

34. Brooks-Gunn, J. Visual impairment: Research assessment. In M. Lewis & L. Taft (Eds.), Developmental disabilities: Theory assessment and intervention. New York: S.P. Medical and Scientific Books, in press.

PUBLICATIONS

ARTICLES AND CHAPTERS (continued)

35. Lewis, M., & Brooks-Gunn, J. The self as social knowledge. In K. Gergen, M. D. Lynch & A. A. Norem-Hebeisen (Eds.), Self-concept: Concepts, development, correlates, and applications. Cambridge: Ballinger Publishing Company, in press.

36. Brooks-Gunn, J., & Lewis, M. Parents of handicapped infants: Their role in identification, assessment, and intervention. In B. Leiler (Ed.), Parent education and involvement. To be published.

37. Ruble, D., & Brooks-Gunn, J. A developmental analysis of menstrual distress in adolescence. In R. C. Friedman (Ed.), Behavior and the menstrual cycle. New York: Marcel-Dekker, in press.

38. Brooks-Gunn, J., & Matthews, W. S. Sex-role development. In I. E. Sigel & D. M. Brodzinsky (Eds.), Psychological development of the child. New York: Holt, Rinehart, and Winston, in press.

39. Lewis, M., & Brooks-Gunn, J. Developmental models and assessment issues. In N. Anastasiow, W. Frankenburg, & A. Fandal (eds), Identifying the developmentally delayed child. Maryland: University Park Press, 1982, in press.

40. Brooks-Gunn, J., & Ruble, D. N. The experience of menarche from a developmental perspective. In J. Brooks-Gunn & A. Petersen (Eds.), Girls at puberty: Biological and psychosocial perspectives. New York: Plenum, in press.

41. Brooks-Gunn, J., & Lewis, M. Screening and evaluating young handicapped children. Topics in Early Childhood Special Education, 1982, in press.

42. Matthews, W. S., & Brooks-Gunn, J. Social development in childhood. In A. Meyers & W. E. Craighead (Eds.), Cognitive behavior therapy for children. New York: Plenum, in press.

43. Brooks-Gunn, J., & Lewis, M. Affective exchanges between normal and handicapped infants and their mothers. In T. Field & A. Fogel (Eds.), Emotion and interaction: Normal and high risk infants. Hillsdale, New Jersey: Erlbaum, in press.

44. Brooks-Gunn, J., & Ruble, D. College men and women's attitudes and beliefs concerning menstruation. Submitted for publication.

45. Lewis, M., & Brooks-Gunn, J. "La reconaissance de son image chez l'enfant et l'animal." In P. Mounoud & A. Vinter (Eds.), Textes de base en psychologie. Paris, 1981.

46. Brooks-Gunn, J., & Hearn, R. Early intervention and developmental dysfunction. Implications for pediatrics. Advances in Pediatrics, 1982, in press.

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PUBLICATIONS

ARTICLES AND CHAPTERS (continued)

47. Brooks-Gunn, J., & Lewis, M. The development of early visual self-recognition. Developmental Review, in press.

48. Brooks-Gunn, J., & Ruble, D. N. Dysmenorrhea in adolescence. In S. Golub (Ed.), Menarche: An interdisciplinary view. New York: Springer, in press.

49. Brooks-Gunn, J., & Lewis, M. Infant social perception: Responses to pictures of parents and strangers. Developmental Psychology, 1981, 17(5), 647-649.

50. Brooks-Gunn, J., & Lewis, M. The development of the self. International Encyclopedia of Education, in press.

51. Brooks-Gunn, J., & Ruble, D. N. Psychological determinants of menstrual-product use in adolescent females. Annals of Internal Medicine, in press.

52. Brooks-Gunn, J., & Ruble, D. N. The Development of Menstrual-Related Beliefs and Behaviors During Early Adolescence. Child Development, in press.

53. Ruble, D. N., & Brooks-Gunn, J. The Experience of Menarche. Child Development, in press.

54. Brooks-Gunn, J., & Weinraub, M. Origins of Infant Intelligence Testing. To appear in M. Lewis (Ed.), Origins of Intelligence. New York: Plenum, in press.

JEANNE BROOKS-GUNN

PUBLICATIONS

OTHER PUBLICATIONS

A. Brooks-Gunn, J. Evaluation of handicapped infants. In B. Frankel & R. Smith (Eds.), Making the difference now: Programs for developmentally delayed infants. Trenton, New Jersey: New Jersey State Division of Mental Retardation, 1978.

B. Brooks-Gunn, J. But we wanted a... Hard Choices, WGBH Educational Foundation, 1980.

C. Brooks-Gunn, J., & Matthews, W. S. How sex roles are established. Sesame Street Newsletter, Children's Television Workshop, (Vol. 1), April 1981.

D. Brooks-Gunn, J., Firsh, B., & Merson, E. M. A principal's eye-view of family-school relationships. Principal, 1982, in press.

E. Brooks-Gunn, J., & Ruble, D. Menstrual Attitude Questionnaire Scales.

1. MAO Spanish
2. MAQ for Adolescent Females
3. MAQ for Adult Females

F. Brooks-Gunn, J. The Development of Social Knowledge: Implications for Research with Handicapped Infants. Paper prepared for the Department of Education, Office of Special Services, Princeton, 1981.

JEANNE BROOKS-GUNN

PUBLICATION LIST

PRESENTATIONS

1. Lewis, M., & Brooks, J. Self, other, and fear: The reaction of infants to people. Paper presented at the Eastern Psychological Association meetings, Symposium on Infants' Fear of the Strange, Boston, April 1972, and at a conference on The Origins of Behavior: Fear, Princeton, October 1973.

2. Brooks, J., & Lewis, M. Attachment behavior in thirteen-month-old, opposite-sex twins. Paper presented at the Society for Research in Child Development meetings, Philadelphia, March 1973.

3. Brooks, J., & Lewis, M. Infants' responses to pictures of self, mother, and other. Paper presented at Eastern Psychological Association meetings, Philadelphia, April 1974.

4. Lewis, M., Young, G., Brooks, J., & Michalson, L. The beginning of friendship. Paper presented at a conference on The Origins of Behavior: Friendship and Peer Relations, Princeton, October 1974.

5. Brooks, J., & Lewis, M. Mirror-image stimulations and self-recognition in infancy. Paper presented at the Society for Research in Child Development meetings, Denver, April 1975.

6. Brooks, J., Michalson, L., & Lewis, M. Person perception and verbal labeling: The development of social labels. Paper presented at the Society for Research in Child Development meetings, Denver, April 1975. A shorter version was presented at the Eastern Psychological Association meetings, New York, April 1975.

7. Lord, S., Lewis, M., & Brooks, J. Person perception: Infants' responses to pictures. Paper presented at the Eastern Psychological Association Meetings, New York, April 1975.

8. Michalson, L., Brooks, J., & Lewis, M. Peers, parents, people: Social relationships in infancy. Paper presented at the Eastern Psychological Association meetings, New York, April 1975.

9. Brooks, J., & Lewis, M. The effect of contingency and the self-other distinction on visual self-recognition in infancy. Paper presented at the Southeastern Conference on Human Development, Nashville, April 1976.

10. Brooks, J., & Lewis, M. Social perception in infancy. Paper presented at a Symposium on Infants' Perception at the International Congress of Psychology, Paris, July 1976.

11. Brooks, J., & Lewis, M. Visual self-recognition in different representational forms. Paper presented at the International Congress of Psychology, Paris, July 1976.

JEANNE BROOKS-GUNN

PUBLICATION LIST

PRESENTATIONS (continued)

12. Ruble, D. N., Brooks, J., & Clarke, A. Research on menstrual-related psychological changes: Alternative perspectives. Paper presented at a conference on Bio-psychological Factors Influencing Sex-Role Related Behaviors, Smith College, October 1976.

13. Lewis, M., & Brooks-Gunn, J. Self-knowledge and emotional development. Paper presented at a conference on The Origins of Behavior: Affect Development, Princeton, February 1977.

14. Lewis, M., Brooks, J., & Haviland, J. Hearts and faces: A study in the measurement of emotion. Paper presented at a conference on The Origins of Behavior: Affect Development, Princeton, February 1977.

15. Lewis, M., & Brooks-Gunn, J. The search for the origins of self: Implications for social behavior and intervention. Paper presented at a Symposium on The Ecology of Care and Education of Children under Three, Berlin, West Germany, February 1977.

16. Brooks-Gunn, J. Chairperson of Symposium on Socio-cultural Aspects of Puberty, Society for Research in Child Development, New Orleans, March 1977.

17. Ruble, D. N., & Brooks-Gunn, J. Young adolescents' attitudes about menstruation. Paper presented at the Society for Research in Child Development meetings, Symposium on Socio-cultural Aspects of Puberty, New Orleans, March 1977.

18. Brooks-Gunn, J. Problems in evaluating infants: The need for research. Paper presented at The Mental Retardation Conference, New York, June 1977.

19. Brooks-Gunn, J., & Ruble, D. N. Menarche: Interaction of physiological, cultural, and social factors. Paper presented at a Conference of The Menstrual Cycle at the University of Illinois Medical Center, Chicago, June 1977.

20. Brooks-Gunn, J. Attentional processes in the handicapped infant: Implications for intervention. Workshop presented at the New Jersey Symposium, Rutgers University, New Brunswick, March 1978.

21. Brooks-Gunn, J. Issues in social and cognitive assessment with handicapped infants. Workshop on Handicapped Infant Assessment at the International Conference on Infant Studies meetings, Providence, Rhode Island, March 1978.

22. Brooks-Gunn, J. Moderator of debate on the cardiac response and behavior. International Conference on Infant Studies meetings, Providence, Rhode Island, March 1978.

23. Brooks-Gunn, J. Stranger characteristics and appraisal. Debate on the Contribution of Social Dimensions and Interactional Variables to the Infant's Appraisal of Strangers. International Conference on Infant Studies meetings. Providence, Rhode Island, March 1978.

JEANNE BROOKS-GUNN

PUBLICATION LIST

PRESENTATIONS (continued)

24. Shapiro, J., & Brooks-Gunn, J. Temperament characteristics of handicapped infants. Paper presented at The Eastern Psychological Association meetings, Washington, D.C., March 1978.

25. Brooks-Gunn, J., & Ruble, D. N. Menstrual-related symptomatology in adolescents: The effects of attitudes, first menstrual experience, and parental factors. Paper presented at the second annual Conference on Interdisciplinary Research on the Menstrual Cycle, St. Louis, May 1978.

26. Lewis, M., & Brooks-Gunn, J. The ontogeny of self. Paper presented at the Self-Concept Symposium, Boston, September 1978.

27. Brooks-Gunn, J. Chairperson of a Symposium on the Changing American Parent: Implications for Child Development at the Society for Research in Child Development meetings, San Francisco, March 1979.

28. Weinraub, M., & Brooks-Gunn, J. Declining parental sex-role stereotypes: Movement toward androgyny? Paper presented in a Symposium on The Changing American Parent: Implications for Child Development at the Society for Research in Child Development meetings, San Francisco, March 1979.

29. Brooks-Gunn, J., & Ruble, D. N. The social and psychological meaning of menarche. Paper presented in a Symposium on Psychological Correlates of Puberty at the Society for Research in Child Development meetings, San Francisco, March 1979.

30. Brooks-Gunn, J. Moderator of and discussant for a Symposium on Methods and Models of Menstrual Cycle Research. Interdisciplinary Research Conference on Menopause, Tucson, May 1979.

31. Brooks-Gunn, J., & Ruble, D. N. Expectations regarding menstrual symptoms: Effects on evaluations and behavior of women. Paper presented at the Interdisciplinary Research Conference on Menopause, Tucson, May 1979.

32. Appel, M., & Brooks-Gunn, J. Intervention strategies for the young handicapped child. Paper presented in a Symposium at the American Association Academy of Mental Deficiency meetings, Miami, May 1979.

33. Brooks-Gunn, J., & Lewis, M. Parents of handicapped infants: Their role in identification, assessment and intervention. Paper presented at a Symposium on Parent-Child Interaction Findings and Their Implications for Education and Involvement, Chapel Hill, June 1979.

34. Brooks-Gunn, J. Assessment and evaluation of the handicapped preschooler. Speaker at the Conference on Developmental Disabilities in the Preschool Child, Hightstown, June 1979.

JEANNE BROOKS-GUNN

PUBLICATION LIST

PRESENTATIONS (continued)

35. Brooks-Gunn, J., & Lewis, M. Handicapped infants and their mothers at play. Paper presented at a Symposium on Handicapped Infants and Their Mothers at the American Psychological Association meetings, New York City, September 1979.

36. Brooks-Gunn, J., & Ruble, D. N. Sociocultural factors relating to dysmenorrhea in adolescence. Paper presented in a Symposium on The Nature and Treatment of Dysmenorrhea at the American Psychological Association meetings, New York City, September 1979.

37. Ruble, D. N., & Brooks-Gunn, J. A social cognition analysis of perceptions of menstrual symptoms. Paper presented in a Symposium on Cognitive Processes in the Reporting of Physical Symptoms at the American Psychological Association meetings, New York City, September 1979.

38. Brooks-Gunn, J. Critical Issues in Visual Impairment. Paper presented at a conference on Developmental Disabilities in the Preschool Child: Early Identification and Intervention Strategies, Chicago, September 1979.

39. Brooks-Gunn, J. The importance of mother-infant interaction to clinical practice. Paper presented at a Symposium on Evaluation and Clinical Application of the Mother-Infant Interaction at the American Academy of Child Psychiatry meetings, Atlanta, October 1979.

40. Matthews, M., & Brooks-Gunn, J. The Development of Sex-Role Identity. Invited address at the Middle-Atlantic Regional Library Conference, Lancaster, October 1979.

41. Brooks-Gunn, J. Workshop presentation on Assessment and the Young Handicapped Child, Handicapped Children's Early Education Program Conference, Washington, D.C., December 1979.

42. Brooks-Gunn, J., & Lewis, M. The relationship of social and cognitive development in Down's Syndrome infants. Paper presented at a Symposium on Social and Cognitive Development in Down's Syndrome Infants at the International Conference on Infant Studies, New Haven, April 1980.

43. Lewis, M., & Brooks-Gunn, J. Logical problems in research with exceptional children. Paper presented at a Symposium on Social and Cognitive Development in Down's Syndrome Infants at the International Conference on Infant Studies, New Haven, April 1980.

44. Brooks-Gunn, J. The effect of maternal androgyny on mother-child interactions. Paper presented at the Southeastern Conference on Human Development, Alexandria, April 1980.

JEANNE BROOKS-GUNN

PUBLICATION LIST

PRESENTATIONS (Continued)

45. Brooks-Gunn, J. Considerations in the study of early female adolescence. Paper presented in a Symposium on the Psychological Significance of Pubertal Changes. American Psychological Association, Montreal, September 1980.

46. Brooks-Gunn, J. The role of research in early childhood intervention. Educational Testing Service Seminar Series in Special Education, Princeton, October 1980.

47. Brooks-Gunn, J. Research on handicapped infants: From theory to practice. Paper presented at Educational Testing Service Seminar Series in Special Education, Princeton, November 1980.

48. Brooks-Gunn, J. Research and intervention with young handicapped children. Educational Testing Service Seminar Series, Atlanta, December 1980.

49. Brooks-Gunn, J. Early attention, prediction and child evaluation. Handicapped Children's Early Education Program Conference, Washington, D.C., December 1980.

50. Brooks-Gunn, J. New techniques for assessing the handicapped young. Handicapped Children's Early Education Program Conference, Washington, D.C., December 1980.

51. Brooks-Gunn, J., & Lewis, M. Affective exchanges between mothers and their normal and dysfunctional infants. Paper presented at a Conference on Affective Displays of High-Risk Infants, Miami, December 1980.

52. Brooks-Gunn, J. Attention, motivation and the young developmentally delayed child. New Jersey Association of Learning Consultants Symposium, Woodbridge, December 1980.

53. Brooks-Gunn, J., & Lewis, M. Temperament characteristics of handicapped infants. Paper presented in a Symposium on Temperament Characteristics of Atypical Infants at the Society for Research in Child Development meetings, Boston, April 1981.

54. Brooks-Gunn, J. Developmental changes in preferences of infants. Symposium on Maternal Behavior: Origins in Puberty? At the Society for Research in Child Development meetings, Boston, April 1981.

55. Hartka, E., Brooks-Gunn, J., & Lewis, M. Age changes in contingent learning. Paper presented at Eastern Psychology Association meetings, New York City, April 1981.

56. Brooks-Gunn, J., & Ruble, D. N. The experience of menarche from a developmental perspective. Paper presented at a Conference on Female Pubertal Development, The Salk Institute, La Jolla, March 1981.

JEANNE BROOKS-GUNN

PUBLICATION LIST

PRESENTATIONS (Continued)

57. Brooks-Gunn, J. Menarche and dysmenorrhea. Paper presented in a Symposium on Dysmenorrhea at a Conference on Menarche, New Rochelle, June 1981.

58. Brooks-Gunn, J. Constructing a profile of the child in infancy. Paper presented in a Symposium on the Application of Developmental Principles to Handicapped Infants at the Council for Exceptional Children meetings, New York City, April 1981.

59. Brooks-Gunn, J. Child public policy for the 1980's. Keynote address at the New Jersey Symposium, Rutgers University, May 1981.

60. Brooks-Gunn, J. Sociocultural determinants of menstrual distress: Menarche and self-image. Paper presented at a symposium "Puberty: Social and Psychological Significance" at the American Psychology Association meetings, Los Angeles, August 1981.

61. Brooks-Gunn, J. Transitions in Gender Role Development in Childhood and Adolescence. Paper presented at a conference on Gender Role Development at NICHD, Bethesda, October 1981.

62. Brooks-Gunn, J. Facilitating Infant Development via Intervention: Prevention and Remediation Models. Paper presented at an Aspen Institute Conference, Enhancing Human Development: The First Twenty Years of Life, The Aspen Institute, August 1981.

63. Brooks-Gunn, J. Psychological determinants of menstrual-product use in adolescent females. Paper presented at the Institute of Medicine Conference on Toxic Shock Syndrome, Alexandria, Virginia, November 1981.

64. Brooks-Gunn, J. Temperament in the Handicapped Infant: Implications for Intervention. Paper presented at the HCEEP Conference, Washington, D.C., December 1981.

CURRICULUM VITAE

NAME: Richard P. Brinker

PRESENT ADDRESS:
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PLACE OF BIRTH: Hamilton, Ohio

EDUCATION: University of Notre Dame, South Bend, Indiana B.A. (Magna Cum Laude), 1971, Psychology.

George Peabody College for Teachers, Nashville, Tennessee, M.A., 1973. Psychology and Human Development. Ph.D., 1975.

HONORS: Graduated Magna Cum Laude, University of Notre Dame.

AWARDS: Ford Foundation Endowment, 1968-71.

National Institute of Child Health and Human Development Pre-doctoral Fellowship, 1972-75.

Honorable Mention in the National Talent Search "Computing for the Handicapped," Johns Hopkins University, 1981.

GRANTS & CONTRACTS: 1980-1983 - Contract #300-80-0638 to Evaluate Integrated Educational Services for Severely Handicapped Children/ Youth. U.S. Office of Special Education, $568,000.

MEMBERSHIPS:

American Psychological Association

American Association on Mental Deficiency

The Association for the Severely Handicapped

The Society for Research in Child Development

Society for the Experimental Analysis of Behavior

Council for Exceptional Children

EXPERIENCE: RESEARCH

1979-

Research Scientist of Educational Testing Service.

Coordinator of the Contingency Intervention and Evaluation Unit of the Institute for the Study of Exceptional Children. Responsibilities include the development, implementation and evaluation of a process curriculum to enhance the contingency awareness of severely handicapped infants. In addition, responsibilities include acting as a resource to preschool programs in the State of New Jersey and assisting in the generation of federal, state and local support to evaluate services for handicapped preschoolers.

Principal Investigator of a project to evaluate the impact of integration of severely handicapped students in regular educational settings in 14 local education agencies across America.

1978-1979

Assistant Professor of Special Education, University of Nebraska, Omaha. Lectured on early education of handicapped children. Advised students and supervised practicum placements at Hattie B. Munroe Nursery School.

Director, Hatti B. Munroe Nursery School and
Multiply Handicapped Programs
Meyer Children's Rehabilitation Institute
University of Nebraska Medical Center

Developed program for severely, mentally and multiply handicapped preschool and school-aged children and their families. Directed five classrooms each with a teacher and a teaching assistant, and worked jointly with project coordinator to oversee implementation of programs for children. Generated federal, state, and local support through grants and other service contracts for the Nursery School program.

Assistant Professor of Psychology
(Adjunct appointment)

Participated in the developmental subcommittee of the psychology department. Taught occasional courses.

1975-1978

Research Fellow, Hester Adrian Research Centre, University of Manchester, England. Designed a model preschool for mentally handicapped children and their families. Developed and evaluated a variety of programs for teaching language and communication. Developed analytical tool and record system for planning individual educational programs.

1974-1975

Coordinator of Data Collection Activities for the Prevention-Intervention Project, Tennessee Department of Mental Health, Nashville. Trained and monitored reliability of classroom observers in five counties. Organized administration of tests of (a) children's achievement and (b) teacher's educational strategies. Assisted in analysis and evaluation of project's effectiveness.

EXPERIENCE: RESEARCH (continued)

1972-1975	Research Trainee of the National Institute of Child Health and Human Development, Mental Retardation research training program, George Peabody College for Teachers, Nashville, Tennessee. Research Associate of the Infant, Toddler and Preschool Research and Intervention Project. My activities included (a) teaching self-help and imitative skills to young handicapped children, (b) acting as a family consultant and liaison for families attending on a weekly clinic basis, (c) assisting in the design of research strategies in the area of language acquisition and participation in grant writing in this area. During this time, I also conducted research on the effect of response-reinforcer contingency upon choice in the comparative developmental laboratory.
1971-1972	Research assistant in the Laboratory of Symbolic Processes of the Institute on Mental Retardation and Intellectual Development, John F. Kennedy Center for Research on Education and Human Development, George Peabody College. Assisted in the implementation of studies on reading and classification by school-age mentally handicapped children.
1969-1971	Research assistant to Dr. William E. Dawson in the Laboratory of Sensory Processes and Psychophysics, Department of Psychology, University of Notre Dame. Assisted in design and implementation of studies to extend psychophysical scaling techniques to the scaling of attitudes.

EXPERIENCE: TEACHING

1976 & 1977	Behavior Modification sections of the M.Sc. courses in Educational Psychology, University of Manchester.
1976	Behavioral Methods section of the course on Mental Handicap for in-service training of Clinical Psychologists, University of Manchester.
1977	Developmental and Ecological Perspectives on Mental Handicap. The Development of Skilled Behavior in the Mentally Handicapped: With Special Reference to Language Communication. Lectures to the postgraduate course for the Master of Science Degree in Clinical Psychology, University of Manchester.
1977	Alternative approaches to teaching Language and Communication to Retarded Children. Lecture to the in-service training course for Educational and Clinical Psychologists, University of Birmingham.

EXPERIENCE: TEACHING (continued)

1977	Behavioral/Developmental Approaches to Teaching First Words to Retarded Children. Lecture to the undergraduate course in the Education of Mentally Handicapped Children, Universite de l'Etat a Mons, Mons, Belgium.
1978	Systematic Language Programs. Lecture to the Department of Education and Science's regional in-service training course on communication disorders in children, University of Liverpool.
1978	The Warnock Report and the American Education for All Handicapped Children Act. Lecture to the in-service course on the Warnock Report sponsored by the Department of Adult and Higher Education, University of Manchester.
1977-1978	Supervision of postgraduate doctoral thesis, Hester Adrian Research Centre.
1976-1978	Supervision of undergraduate honors research projects, Department of Psychology, University of Manchester.
1977	Supervision of in-service training for postgraduate clinical psychology students, Department of Clinical Psychology, University of Manchester.
1979	Diagnostic and Remediation Procedures in the Early Education of the Handicapped. Graduate course in Special Education at the University of Nebraska at Omaha.
1979	Interdisciplinary approaches to Treatment of the Handicapped. Graduate course in Special Education at the University of Nebraska at Omaha.
1979	The Study of Language Development. Lecture to the Professional Seminar for Doctoral Students in Psychology at the University of Nebraska at Omaha.
1979	The Development of Preschool Children. Lecture to the undergraduate Life Span Developmental Psychology course, University of Nebraska at Omaha.
1979	The Preschool Handicapped Child: Development and Intervention. Lecture to the undergraduate Introduction to Special Education course, University of Nebraska at Omaha.

PUBLICATIONS:

1. Dawson, W. E., & Brinker, R. P. Validation of ratio scales of opinion by multimodality matching. Perception and Psychophysics, 1971, 9, 413-417.

2. Brinker, R. P., & Bricker, W. A. Determination of interrelationships within a limited behavioral repertoire. In D. Bricker and W. Bricker, Infant, Toddler, and Preschool Research and Intervention Project Report. Year III. Behavioral Science Monograph No. 23, Institute on Mental Retardation and Intellectual Development, George Peabody College, 1973.

3. Brinker, R. P., & Treadway, J. T. Preference and discrimination between response dependent and response independent schedules of reinforcement. Journal of the Experimental Analysis of Behavior, 1975, 24, 73-77.

4. Brinker, R. P. Predicting children's classroom behavior from teacher's classroom behavior and psychometric descriptions of children. Doctoral dissertation, George Peabody College for Teachers, Dissertation Abstracts International, 1976, No. 76-21618, 25894.

5. Brinker, R. P. Teaching language in context: A feasibility study. La Revue de Phonetique Appliquee, 46/47, 1978, 195-203.

6. Hogg, J., & Brinker, R. P. Introduction. In J. Hogg (Ed.), Anson House Preschool Project Papers Volume 1: The First Two Years. Hertford, England: Dr. Barnardos, 1979.

7. Brinker, R. P., & Goldbart, J. Developments in research: The language programme. In J. Hogg (Ed.), Anson House Preschool Project Papers Volume 1: The First Two Years. Hertford, England: Dr. Barnardos, 1979.

8. Brinker, R. P., & Bricker, D. D. Teaching a first language: Building complex structures from simpler components. In J. Hogg and P. Mittler (Eds.), Advances in Mental Handicap Research, John Wiley, 1980, pp. 197-223.

9. Beveridge, M., & Brinker, R. P. An ecological-developmental approach to communication in retarded children. In M. F. Jones (Ed.), Language Disability in Children. London: MTP Press, 1980, 45-67.

10. Brinker, R. P., & Goldbart, J. The problem of reliability in the study of early communication skills. The British Journal of Psychology, 1981, 72, 27-41.

11. Brinker, R. P. Contextual contours and the development of language by retarded children. In M. Beveridge (Ed.), Children thinking through language. London: Edward Arnold, 1981.

PUBLICATIONS (continued)

12. Brinker, R. P., & Lewis, M. Contingency intervention in infancy. In J. Anderson (Ed.), Curriculum materials for high risk and handicapped infants. Chapel Hill, North Carolina: Technical Assistance and Development System, in press.

13. Brinker, R. P., & Lewis, M. Discovering the competent handicapped infant: A process approach to assessment and intervention. Topics in Early Childhood Education, 1982, 2(2).

PAPERS PRESENTED:

1. Brinker, R. P. Implications of the Wyatt versus Stickney trial for treatment of mentally retarded people in residential institutions. Colloquium at Cloverbottom State School and Hospital, Donaldson, Tennessee, April 1972.

2. Brinker, R. P. Brighter futures for severely mentally handicapped children. Presented to the National Council for Special Education, Penrith, England, June 26, 1976.

3. Brinker, R. P. Mainstream education for handicapped children: Behavior in integrated settings. Departmental colloquium for the Hester Adrian Research Centre and the Faculty of Education, University of Manchester, October 21, 1976.

4. Brinker, R. P., & Cantrell, R. P. Predicting children's classroom behavior from teacher's classroom behavior and psychometric descriptions of children. Paper presented at the annual meeting of the Council for Exceptional Children, Atlanta, Georgia, 1977.

5. Brinker, R. P. Teaching language in context: A feasibility study. Paper presented to the Conference on Language and Language Acquisition sponsored by the International Brain Research Organization, Universite de l'Etat a Mons, Mons, Belgium, December 1977. (To appear in the Conference Proceedings.)

6. Brinker, R. P. Educating the mentally handicapped in England. Colloquium to the Child Development and Learning Disabilities Center, University of Alabama at Birmingham, January 1978.

7. Brinker, R. P. Special Education in England and the United States: Educational Accountability. Colloquium to the Department of Special Education, Kent State University, January 1978.

8. Brinker, R. P. The influence of the developmental model of retardation on educational practice in England and the United States. Colloquium presented to the Illinois Institute for Developmental Disabilities, January, 1978.

PAPERS PRESENTED (continued)

9. Brinker, R. P. The objectivity of descriptive studies of early language development. Seminar to the Department of Psychology, University of Manchester, England, October, 1978.

10. Brinker, R. P. The psychological assessment of the infant. Paper presented to the state conference on Assessment and Practical Programming for Infants and Preschool Children, Cozad, Nebraska, March, 1979.

11. Brinker, R. P. Behavior problems: How can I help? Workshop sponsored by the Nebraska Department of Education, "Parents...getting involved with your child's educational future," Omaha, Nebraska, June, 1979.

12. Brinker, R. P. Problems in the study of communication and language development of preschool handicapped children. Colloquium to the Institute for the Study of Exceptional Children, Educational Testing Service, Princeton, New Jersey, August, 1979.

13. Brinker, R. P. You've been cordially invited to an I.E.P. Workshop sponsored by Nebraska Department of Education, "Parents, you're part of the team: Effective parent participation," Omaha, Nebraska, September, 1979.

14. Brinker, R. P. Making the model programs work in service delivery systems. Panel organized and chaired for the Sixth Annual Conference of the American Association for the Education of the Severely/Profoundly Handicapped. Participants: W. Bricker, R. P. Cantrell, S. DeCaluwe, M. Kopaczynski, Cordelia Robinson. October, 1979.

15. Brinker, R. P. The problems of providing free appropriate public education from the time of diagnosis: The parable of the frozen bird. Paper presented to the annual convention of the Nebraska Chapter of the Council for Exceptional Children, Lincoln, Nebraska, November, 1979.

16. Brinker, R. P. Dealing with the handicapped child in the regular preschool. Paper presented to the annual convention of the Nebraska Chapter of the National Association for the Education of Young Children, Omaha, Nebraska, November, 1979.

17. Brinker, R. P. Research on the integration of preschool handicapped children: Social and cognitive effects. Paper presented to the Research Colloquium on the Study of Integration of Handicapped Children, Meyer Children's Rehabilitation Institute, University of Nebraska, December, 1979.

18. Tucker, N., & Brinker, R. P. Preschoolers' feelings about children with physically handicapping conditions. Poster session, paper presented at the annual convention of the American Association on Mental Deficiency, San Francisco, May, 1980.

PAPERS PRESENTED (continued)

19. Brinker, R. P. A process approach to intervention in infancy. Workshop in Special Education sponsored by Educational Testing Service, October, 1980.

20. Brinker, R. P. Innovation in integration of severely handicapped and deaf-blind children. Panel discussion at the seventh annual conference of the association for the severely handicapped, Los Angeles, October, 1980.

21. Brinker, R. P., & Deni, K. Assessing low incidence severely handicapped populations. Workshop for New Jersey Special Education Association, Bergen County, Special Education Unit, November, 1980.

22. Brinker, R. P. Learning for its own sake: Contingency intervention in the first year of life. Paper presented at the annual conference for the Handicapped Children's Early Education Programs, Washington, D.C., December, 1980.

23. Brinker, R. P., & Lewis, M. Patterns of learning by handicapped infants. Paper presented at the biennial convention of the Society for Research in Child Development, Boston, 1981.

24. Brinker, R. P., & Lewis, M. Intervening in the motivational systems of handicapped infants: A process approach with product implications. Paper presented at the 59th annual convention of the Council for Exceptional Children, New York, 1981.

25. Brinker, R. P. Confronting the challenges of 94-142 and section 504 in times of fiscal and political austerity. Address to the Iowa Developmental Disabilities Council and Civil Rights Commission. Workshop on Public Awareness and Consumer Responsibility, Des Moines, June, 1981.

26. Brinker, R. P., & Thorpe, M. A national perspective on integration of severely handicapped children/youth in regular educational settings. Symposium presented at the eighth annual convention of The Association for the Severely Handicapped, New York, October, 1981.

CONSULTANCY

Consultant to the language research group, Mailman Center for Child Development, University of Miami, October, 1975.

Consultant to the communication development group of the Consortium on Adaptive Performance Evaluation, Mailman Center for Child Development, University of Miami, January, 1978.

Consultant to Akron Children's Hospital, Outreach Program for Molly Stark Hospital, Akron, Ohio, January, 1978.

Consultant to the early intervention project of the Illinois Institute for Developmental Disabilities, Chicago, Illinois, January, 1978.

Consultant to the Center on Human Development, University of Oregon, Eugene, November, 1980, November, 1981.

CURRICULUM VITAE

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EDUCATION:

1971-1975	Harvard University: Doctorate in Child Development, Thesis topic: Development of Attachment Relationships in Kibbutz Reared Infants.
1966-1970	Williams College: A.B. with Honors in Political Science.

RESEARCH EXPERIENCE:

1977-	Research Psychologist, Institute for Research in Human Development, Educational Testing Service, Princeton, New Jersey.
1977-	Research Scientist, Pediatric Service, St. Luke's-Roosevelt Hospital Center, New York, New York.
1977-	Coordinator, Identification Unit, Institute for the Study of Exceptional Children, Pediatric Service, St. Luke's-Roosevelt Hospital Center, and Educational Testing Service.

ACADEMIC EXPERIENCE:

1981-	Visiting Lecturer in Psychology, New School for Social Research.
1978-	Assistant Professor, Clinical Pediatric Psychology, College of Physicians and Surgeons, Columbia University.
1978-	Adjunct Assistant Professor of Psychology, Department of Psychology, New York University.
1976-1977	Assistant Professor, Hebrew University, Jerusalem and Ben-Gurion University of the Negev, Beersheva, Israel, Psychology Department.

1975-1977	NIMH Post-Doctoral Fellow, Harvard University 1975-1976. Post Doctoral research on infant cognitive development.
1972-1975	Teaching Fellow, Department of Psychology and Social Relations, Harvard University.

AWARDS AND HONORS:

1976-1977	NIH Post-Doctoral Fellowship, Cross-Cultural Child Development, Harvard University.
1974-1975	NIMH Pre-Doctoral Training Grant for dissertation research. Nine months field work on Israeli kibbutz-research and data collection.
1972-1973	Teacher Training Fellowship, Harvard University, Federally funded project supervising Junior High School students in day care setting.
1970	Mead Government Intern Fellowship, Williams College.
1966-1970	[illegible]kins Scholar, Williams College.

WORK EXPERIENCE:

1976-1977	Group leader and coordinator, Parent Education Project, Hadassah Hospital, Jerusalem, Israel. Project was to familiarize new parents with available social services and to present issues in early infant care and development.
1976-1977	Psychologist, Developmental Evaluation Clinic, Beersheva University Hospital, Beersheva, Israel. Clinic was set up to screen infants judged to be at-risk at birth.
1972-1974	Research Associate, Center for Research in Children's Television, Harvard University. Research on visual attention in pre-school children to various techniques of animation.
1972	Systems Analyst, Huron Institute, Cambridge, Mass. Summer. Computer programming and statistical analysis for "Follow-Through-Head Start" project.
1972-1973	Consultant, Day Care Project, Brookline Early Education Project, Harvard University.
1971-1972	Coordinator, Day Care Project, Brookline Early Education Project, Harvard University.

1970-1971 Teacher, Kindergarten, Bennington Public School System, Bennington, Vermont.

1970-1971 Founder and Director, Beech Court Nursery School Bennington, Vermont.

PROFESSIONAL MEMBERSHIPS:

New York Academy of Sciences
American Psychological Association
Society for Research in Child Development
Society for Cross-Cultural Research
Society for Psychophysiological Research
International Neuropsychological Society

REVIEWING:

Journal:
CHILD DEVELOPMENT
PSYCHOPHYSIOLOGY
DEVELOPMENTAL PSYCHOLOGY

Grant Agencies:
NICHD
National Foundation - March of Dimes
MacArthur Foundation
Bureau for the Education of the Handicapped

GRANT SUPPORT:

1981 Young Scholar Grant from The Foundation for Child Development, "Affective responsivity and hemispheric asymmetry in 10 month old infants."

1980 SRCD Study Group on The Development of Affect and Cerebral Asymmetry, with R.J. Davidson.

1977 Grant from The Foundation for Child Development, "The Development of Self Concept in Israeli School Age Children".

BOOKS AND CHAPTERS:

Kennedy, J. & Fox, N. Pictures to see and pictures to touch, in D. Perkins and B. Leondar (Eds.), Art and Cognition, Springer Press, 1974.

Lewis, M. & Fox, N. Predicting cognitive development from assessments in infancy, in B. Camp (Ed.), Advances in Behavioral Pediatrics, Vol. I, JAI Press, 1980.

Fox, N. Assessment of the mother-infant interaction: A research design for clinical evaluation and intervention. In S. Harel (Ed.) Infants At Risk, Excerpta Medica, The Netherlands, 1980.

Fox, N. & Lewis, M. The role of maturation and experience in preterm development, in J. Gallagher (Ed.) New Directions in Special Education, San Francisco, Jossey-Bass, 1980.

Fox, N. & Davidson, R.J. The psychobiological substrates of affective development over the first two years of life. In N. Fox & R.J. Davidson (Eds.) The psychobiology of affective development, Erlbaum, Hillside, New Jersey, In Preparation.

Fox, N., Affective development in high risk infants. In N. Fox & R.J. Davidson (Eds.) The psychobiology of affective development, Erlbaum, Hillside, New Jersey, In Preparation.

PAPERS:

Kennedy, J. & Fox, N. Teaching the blind to see, Harvard Graduate School of Education Bulletin, 1972.

Rogoff, B., Sellers, M., Pirotta, S., Fox, N. & White, S. A cross-cultural analysis of age shifts in child behavior, Human Development, 1975.
Also:
In A. Skolnick (Ed.) Rethinking children's prospectus on development and society. New York: Little Brown, 1976, pp 249-368.

Fox, N. Attachment of Israeli Kibbutz infants to mother and metapelet, Child Development, 48, 4, December, 1977, 1228-1239.

Fox, N. Lateral differences in preterm infant responsiveness and subsequent hemispheric specialization for language, International Neuropsychological Bulletin 1979.

Fox, N., Kagan, J., & Weiskopf, S. The development of memory in the first year of life, Genetic Psychology Monographs, 1979, 99, 91-130.

Fox, N. & Lombardi, N. Neurodevelopmental assessment of the preterm infant, Pediatric Research, 14, 433, 1980.

Fox, N. and Miner, C. Visual attention in preterm infants, Pediatric Research, 14, 433, 1980.

Rogoff, B., Newcombe, N., Fox, N., & Ellis, S. Transitions in childrens roles and capabilities, International Journal of Psychology, 1980, 15, 181-200.

Fox, N. & Lewis, M. Preterm motor asymmetries: Effects of illness and maturity, Developmental Psychobiology, 1981, 14, in press.

SUBMITTED FOR PUBLICATION:

Davidson, R.J. & Fox, N. Asymmetrical brain activity discriminates between positive versus negative affect in ten month old infants.

Fox, N. & Lewis, M. Auditory attention in three month preterm infants.

Fox, N. & Hernandez, A. Cardiac response to auditory stimuli in preterm infants.

Fox, N. & Lewis, M. Mother-infant interaction with the high risk infant: Effects of illness and maturity.

Fox, N., Lewis, M. & Stoltz-Loike, M. Three month old infant's response to face and voice violation.

Fox, N. & Lewis, M. Prematurity, illness, and experience as factors in preterm development.

PRESENTATIONS:

Grand Rounds Presentations:

Fox, N. Attachment: The beginnings of social development. Paper presented at Grand Rounds, Department of Child Psychiatry, St. Luke's Hospital, New York, March 1978.

Fox, N. Neurobehavioral development of the preterm infant. Paper presented to the Pediatric Service, Roosevelt Hospital October 1979.

Fox, N. The development of the parent-child relationship in the first year of life. Paper presented to the Child Psychiatry Service, St. Luke's Hospital, February 1980.

Fox, N. Socio-affective development of the high risk infant. Paper presented to Joint Rounds of the Departments of Psychiatry and Pediatrics, Montefiore Hospital, January 1981.

Fox, N. Developmental issues in the socio-affective behavior of preterm infants. Paper presented to the Department of Psychiatry, St. Luke's-Roosevelt Hospital, May 1981.

Fox, N. Attention and autonomic balance in the preterm infant. Paper presented to the Pediatric Service, St. Luke's-Roosevelt Hospital, June, 1981.

Scientific Conferences:

Fox, N. Determinants of separation protest in infants on the Israeli Kibbutz. Paper presented at the Biennial Meeting of the Society for Research in Child Development, Denver, Colorado, April, 1975.

Fox, N. Development of attachment behaviors of Kibbutz reared infants to mother and metapelet. Paper presented at the meeting of the Eastern Psychological Association, New York, April, 1976.

Fox, N. Attachment behavior and mother's support system. Paper presented at the meeting of the Society for Cross-Cultural Research, New Haven, Connecticut, February, 1978.

Fox, N. *The relationship of ordinal position to attachment behaviors on the Israeli Kibbutz.* Paper presented at the International Conference on Infant Studies, Providence, Rhode Island, March, 1978.

Fox, N. *Infant attachment behavior, ordinal position and caretaking response: A cross-cultural study.* Paper presented at the Eastern Psychological Association Meeting, Washington, D.C., March, 1978.

Fox, N. *Assessment of the mother-infant interaction: A research design for clinical evaluation and intervention.* Paper presented at the International Congress and Workshop on the At-Risk Infant, Tel-aviv, July, 1979.

Fox, N. *The consequences of prematurity: The effect of maturation and experience on later development.* Paper presented at the International Congress and Workshop on the At-Risk Infant, Tel-Aviv, July, 1979.

Fox, N. *Cardiac response to two types of auditory stimuli in preterm infants.* Paper presented at the meetings of the society for Psychophysiological Research, Cincinnati, October, 1979.

Fox, N., Miner, C., Brandt, L. & Lewis, M. *The mother-infant dyad: A review of developmental research and presentation of a scheme for qualitative evaluation of the dyad.* In N. Fox and I. Kochen (Chairpersons), *Evaluation and clinical application of the mother-infant interaction.* Symposium presented at the meetings of the American Academy of Child Psychiatry, Atlanta, October, 1979.

Fox, N. & Lewis, M. *Lateral differences in preterm infant responsiveness and hemispheric specialization for language.* Paper presented at the meetings of the International Neuropsychological Society, San Francisco, January, 1980.

Fox, N. *Lateral differences in preterm infant responsiveness to auditory stimuli and subsequent hemispheric specialization.* Paper presented at the International Conference on Infant Studies, New Haven, Connecticut, April, 1980.

Levav, M. & Fox, N. *Early mother-high risk infant interaction: Effects of illness and maturity.* Paper presented at the meetings of the Society for Research in Child Development, Boston, April, 1981.

Hernandez, A. & Fox, N. Cardiac orienting response and habituation/dishabituation in term and preterm infants to pure tone stimuli. Paper presented at the meetings of the Society for Research in Child Development, Boston, April, 1981.

Davidson, R.J. & Fox, N. EEG asymmetry during the perception of positive and negative affect in ten month old infants: Frontal versus parietal differences. Paper presented at the meetings of the Society for Research in Child Development, Boston, April, 1981.

Fox, N. and Davidson, R.J. EEG asymmetries in the perception of affective facial expression in ten month old infants. Paper presented at the meetings of the International Neuropsychological Society, Atlanta, January, 1981.

Hernandez, A & Fox, N. Autonomic control in preterm infants: Effects on attention. Paper presented at the meetings of the Society for Psychophysiological Research, Washington, October, 1981.

Stoltz-Loike, M., & Fox, N. Infant cardiac response to visual and auditory stimuli varying in temporal pattern. Paper presented at the meetings of the Society for Psychophysiological Research, Washington, October, 1981.

Fox, N. Chairperson. The Psychobiology of affective development, Symposium to be presented at the meeting of the International Conference of Infant Studies, Austin, Texas, March, 1982.

Hernandez, A., & Fox, N. Development of autonomic control in term and preterm infants from birth to three months, Paper to be presented at the meetings of the International Conference of Infant Studies, Austin, Texas, March, 1982.

Fox, N., Invited speaker to the Second International Conference on the at-risk infant, Tel-Aviv, Israel, May, 1983.

CURRICULUM VITAE - LOUIS Z. COOPER, M.D.

Date of Birth: December 25, 1931

Birthplace: Albany, Georgia

Education:
B.S. - Yale University 1954
M.D. - Yale University School of Medicine 1957

Postgraduate Training:

Massachusetts Memorial Hospitals
Intern in Medicine 1957-1958

Boston Veteran's Administration Hospital
Jr. Assistant Resident in Medicine 1958-1959

New England Center Hospital
Fellow in Medicine (Infectious Diseases) 1961-1964
Post-Doctoral Fellowship, United States Public Health Service 1961-1963

Academic Appointments:

Tufts University School of Medicine
Instructor in Medicine 1963-1964

New York University School of Medicine
Instructor in Medicine 1964-1965
Assistant Professor of Pediatrics 1965-1969
Associate Professor of Pediatrics 1969-1973

College of Physicians & Surgeons of Columbia University
Professor of Pediatrics 1973-

Hospital Appointments:

Bellevue Hospital
Clinical Assistant Visiting Physician 1964-1965
Assistant Visiting Pediatrician 1965-1969
Hospital Epidemiologist 1966-1968
Associate Visiting Pediatrician 1969-1973

University Hospital
Assistant in Medicine 1964-1965
Assistant Attending in Pediatrics 1965-1969
Associate Attending in Pediatrics 1969-1973

The Roosevelt Hospital
Attending in Pediatrics 1973-
Director, Pediatric Service 1973-

The Babies Hospital, Children's Medical and Surgical Center at Columbia-Presbyterian Medical Center
Attending Pediatrician 1973-

Other: Rubella Project, Director 1965-

Career Scientist Awardee, Health Research Council of the City of New York 1967-1973

Department of Health, Education and Welfare
  Office of Education, Bureau of Education for the Handicapped, Consultant 1968-1972
  Social and Rehabilitation Service, Rehabilitation Services Administration, Division of Developmental Disabilities, Consultant 1972-1973
  National Advisory Council on Services and Facilities for the Developmentally Disabled, Member 1973-1975, Vice Chairman 1975-1976.

President's Committee on Mental Retardation, Consultant 1970-1975.

State of New York Committee for Children (Executive Committee), Member 1970-1973

American Journal of Mental Deficiency, Consulting Editor 1971-1973

Frank Porter Graham Child Development Center, University of North Carolina, National Advisory Committee, Member, 1976-
  Technical Assistance Development System (TADS), Major Advisor 1971-1973
  Developmental Disabilities Technical Assistance System (DD/TA) Advisory Board Member 1972-

Memberships:
American Academy of Pediatrics
American Association for the Advancement of Science
American Association on Mental Deficiency
American Medical Association
American Public Health Association
Infectious Diseases Society of America
Medical Society of the County of New York
Medical Society of the State of New York
Society for Pediatric Research

Military Service: U.S. Air Force, Captain, Medical Corps 1959-1961

Licensure:
Massachusetts - 1958
New York - 1964
Diplomate - National Board of Medical Examiners

MHS 1/77

Louis Z. Cooper, M.D.

Bibliography

1. Cooper, L.Z., Madoff, M.A. and Weinstein, L.: Absorption and excretion of sulfamethomidine, a "long-acting" sulfonamide. Antibiotics and Chemotherapy 12:618-629, 1962.

2. Cooper, L.Z., Madoff, M.A. and Weinstein, L.: Hemolysis of rabbit erythrocytes by purified staphylococcal alpha toxin. I. Kinetics of the lytic reaction. J. Bacteriol. 87:127-135, 1964.

3. Cooper, L.Z., Madoff, M.A. and Weinstein, L.: Hemolysis of rabbit erythrocytes by purified staphylococcal alpha toxin. II. Effects of inhibitors on the hemolytic sequence. J. Bacteriol. 87:136-144, 1964.

4. Cooper, L.Z., Madoff, M.A. and Weinstein, L.: Hemolysis of rabbit erythrocytes by purified staphylococcal alpha toxin. III. Potassium release. J. Bacteriol. 87:145-149, 1964.

5. Klainer, A.S., Madoff, M.A., Cooper, L.Z. and Weinstein, L.: Staphylococcal alpha-hemolysin: Detection on the erythrocyte membrane by immunofluorescence. Science 145:714-715, 1964.

6. Giles, J.P., Cooper, L.Z. and Krugman, S.: The rubella syndrome. J. Pediat. 66:434-437, 1965.

7. Cooper, L.Z., Green, R.H., Krugman, S., Giles, J.P. and Mirick, G.S.: Rubella in contacts of infants with rubella-associated anomalies. Morbidity and Mortality Weekly Report. USPHS, Dept. HEW 14:44-45, 1965.

8. Rausen, A.R., London, R.D., Mizrahi, Z. and Cooper, L.Z.: Generalized bone changes and thrombocytopenic purpura in association with intra-uterine rubella. Pediatrics 36:264-268, 1965.

9. Cooper, L.Z., Green, R.H., Krugman, S., Giles, J.P. and Mirick, G.S.: Neonatal thrombocytopenic purpura and other manifestations of rubella contracted in utero. Amer. J. Dis. Child. 110:416-427, 1965.

10. Cooper, L.Z.: Rubella syndrome. Pediatric Conferences, The Babies Hospital of Newark, New Jersey 8:No. 4, 7-15, 1965.

11. Weiss, D.I., Cooper, L.Z. and Green, R.H.: Infantile glaucoma, a manifestation of congenital rubella. J.A.M.A. 195:105-108, 1966.

12. Cooper, L.Z. and Krugman, S.: Diagnosis and management: congenital rubella. Pediatrics 37:335-338, 1966.

13. Cooper, L.Z., Madoff, M.A. and Weinstein, L.: Heat stability and species range of purified staphylococcal alpha toxin. J. Bacteriol. 91:1686-1692, 1966.

14. Cooper, L.Z.: German measles. Scientific American 215:30-37, 1966.

15. Cooper, L.Z. and Krugman, S.: Clinical manifestations of postnatal and congenital rubella. Arch. Ophthalmol. 77:434-439, 1967.

16. Rausen, A.R., Richter, P., Tallal, L. and Cooper, L.Z.: Hematologic effects of intra-uterine rubella. J.A.M.A. 199:111-114, 1967.

17. Cooper, L.Z.: The congenitally impaired child - a community crisis. Symposium on the Congenitally Impaired Child, The Lighthouse, New York, May 1967, pp. 1-9.

18. Nusbacher, J., Hirschhorn, K. and Cooper, L.Z.: Chromosomal abnormalities in congenital rubella. New Eng. J. Med. 276:1409-1413, 1967.

19. Weiss, D.I. and Cooper, L.Z.: Congenital rubella cataract: special considerations. Eye, Ear, Nose and Throat Monthly 47:28-30, 1968.

20. Cooper, L.Z.: Rubella. In Pediatrics, 14th edition. H.L. Barnett, editor. New York, Appleton-Century-Crofts, 1968, pp. 737-745.

21. Cooper, L.Z., Giles, J.P. and Krugman, S.: Clinical trial of live attenuated rubella virus vaccine, HPV-77 strain. Amer. J. Dis. Child. 115:655-657, 1968.

22. Cooper, L.Z.: Rubella, a preventable cause of birth defects. In Birth Defects: Original Article Series, Intrauterine Infections. Daniel Bergsma, editor. New York, The National Foundation, Vol. 14, No. 7, 1968.

23. Cooper, L.Z., Matters, B.A., Rosenblum, J.K., and Krugman, S.: Experience with a modified rubella hemagglutination inhibition (HI) test. J.A.M.A. 207:89-96, 1969.

24. Cooper, L.Z. and Krugman, S.: The rubella problem. Disease-a-Month, Year Book Medical Publishers, Inc., Chicago, February 1969.

25. Cooper, L.Z., Ziring, P.R., Ockerse, A.B. and Krugman S.: Transient arthritis following rubella vaccination. Proceedings of the International Symposium on Rubella Vaccines, London 1968, Symp. Series Immunobiol. Standard., vol. 11, pp. 435-442 (Karger, Basel/New York 1969).

26. Cooper, L.Z., Fedun, B.A., Matters, B.A. and Krugman, S.: Maternal rubella and the risk to the fetus. Proceedings of the International Symposium on Rubella Vaccines, London 1968, Symp. Series Immunobiol. Standard., vol. 11, pp. 73-78 (Karger, Basel/New York 1969).

27. Cooper, L.Z., Ziring, P.R., Ockerse, A.B., Fedun, B.A., Kiely, B. and Krugman, S.: Rubella: clinical manifestations and management. Amer. J. Dis. Child. 118:18-29, 1969.

28. Cooper, L.Z., Ziring, P.R., Weiss, H.J., Matters, B.A. and Krugman, S.: Transient arthritis after rubella vaccination. Amer. J. Dis. Child. 118: 218-225, 1969.

29. Cooper, L.Z.: Community Challenge: Case Study 1964. Proceedings of the Special Study Institute for the Multihandicapped, October 1967, California State Department of Education, Division of Special Schools and Services.

30. Cooper, L.Z.: Rubella in pregnancy: one indication for therapeutic abortion. Postgraduate Medicine 46:106-108, 1969.

31. Cooper, L.Z.: The child with rubella syndrome. The New Outlook for the Blind 63:290-298, 1969.

32. Cooper, L.Z.: Rubella: the problem. Proceedings of the International Conference on the Application of Vaccines Against Viral, Rickettsial and Bacterial Diseases of Man, Washington, December 1970, pp. 229-239 (PAHO Scientific Publication No. 226).

33. Ziring, P.R., Florman, A.L. and Cooper, L.Z.: The diagnosis of rubella. Ped. Clinics of North America 18:87-97, 1971.

34. Cooper, L.Z.: Deafness: one physician's view. Proceedings National Forum IV, Medical Aspects of Deafness, Atlantic City, March 1971, pp. 5-13.

35. Cooper, L.Z.: Measles. In Dermatology in General Medicine. T.B. Fitzpatrick, editor. New York, McGraw-Hill, Inc., 1971, Chapter 25.

36. Cooper, L.Z.: Rubella, developmental problems and family health services. In Current Issues in Mental Retardation, Selected Papers from the 1970 Staff Development Conferences of the President's Committee on Mental Retardation, 1971, pp. 87-103.

37. Cooper, L.Z.: Rubella vaccination with special emphasis on immunization of women. Proceedings of the International Rubella Conference on Protection for the Postpubertal Female, Montreal 1970, Canad. J. Pub. Health 62:48-55, 1971.

38. Rosenberg, N.R. and Cooper, L.Z.: Vaccines and Viruses. New York, Grosset and Dunlap, Inc., 1971.

39. Cooper, L.Z., Florman, A.L., Ziring, P.R. and Krugman, S.: Loss of rubella HI antibody in children with congenital rubella. Amer. J. Dis. Child. 122:397–403, 1971.

40. Weiss, D.I, Ziring, P.R. and Cooper, L.Z.: Surgery of the rubella cataract. Amer. J. Opthalmol. 73:326-332, 1972.

41. Cooper, L.Z.: The rubella hemagglutination-inhibition test. In Rubella. Herman Friedman and James E. Prier, editors. Springfield, Illinois, Charles C. Thomas, 1973, pp. 8-17.

42. Cooper, L.Z. and Krugman, S.: Congenital Rubella. In Birth Defects Atlas and Compendium. Daniel Bergsma, editor. Baltimore, The Williams and Wilkins Company, pp. 296-297, 1973.

43. Cooper, L.Z.: Rubella in the U.S.A., the problems. Scand. J. Inf. Dis. Suppl. 6, pp. 7-13, 1972.

44. Cooper, L.Z.: Rubella. In Pediatrics, 15th edition. H.L. Barnett, editor. New York, Appleton-Century-Crofts, 1972, pp. 759-769.

45. Wolman, S.R., McMorrow, L.E., Ziring, P.R. and Cooper, L.Z.: Lack of chromosomal breakage in congenital rubella. Pediat. 52: 213-220 (August), 1973.

46. Cooper, L.Z. and Ziring, P.R.: Rubella and Congenital rubella in Current Therapy, H.F. Conn., editor, Philadelphia, W.B. Saunders Co., pp. 61-63, 1974.

47. McMorrow, L.E., Vesikari, T., Wolman, S.R., Giles, J.P., and Cooper, L.Z.: Suppression of the response of lymphoctyes to phytohemagglutinin in rubella. J. Inf. Dis. 130:464-469, 1974.

48. Ziring, P.R., Weiss, D.I, Cooper, L.Z.: The association of congenital glaucoma with the Rubenstein-Taybi Syndrome. J. Ped. Opthalmol. 11:203-206, 1974.

49. Vesikari, T., Kanra, G.Y., Buimovici-Klein, E., and Cooper, L.Z.: Cell-mediated immunity in rubella assayed by cytotoxicity of supernatants from rubella virus-stimulated human lymphocyte cultures. Clin. Exp. Immunol. 19:33-43, 1975.

50. Cooper, L.Z. and Schweitzer, M.D.: Hospital personnel: the immunization gap Hospital Practice 49:11-12, (March) 1974.

51. Falvo, C.E. and Cooper, L.Z.: Immunization, a continuing need. Primary Care 2:209-219 (June) 1975.

52. Cooper, L.Z.: Congenital rubella in the United States. Infections of the Fetus and the Newborn Infant, edited by S. Krugman and A.A. Gershon, (Progress in Clinical and Biological Research, Volume 3), New York, Alan R. Liss, Inc., 1975, pp. 1-22.

53. Ziring, P.R., Fedun, B.A. and Cooper, L.Z.: Thyrotoxicosis in congenital rubella. J. Pediatr. 87:1002, 1975.

54. Cooper, L.Z.: Rubella. Urban Health, 4:29, 1975

55. Cooper, L.Z. and Ziring, P.R.: Rubella and congenital rubella in Current Pediatric Therapy, S.S. Gellis and B.M. Kagan, editors, Philadelphia, W.B. Saunders Company, 1976, pp. 592-595.

56. Lee, T.B., Stingle, W.H., Ombres, P., Lewis, J.S. and Cooper, L.Z.: Neonatal meningitis and mastoiditis caused by hemophilus influenzae, J.A.M.A. 235:407-409, 1976.

57. Cooper, L.Z.: Reaction to: Kramer, J.R.: The right not to be mentally retarded. In: The Mentally Retarded Citizen and the Law, ed. by Michael Kindred, et al., New York, The Free Press, 1976, pp. 60-61.

58. Buimovici-Klein, E., Vesikari, T., Santangelo, C.F., and Cooper, L.Z.: Study of the lymphocyte in vitro response to rubella antigen and phytohemagglutinin by a whole blood method, Arch. Virol. 52:323-331, 1976.

CURRICULUM VITAE - MADELINE W. APPELL

RESIDENCE

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DATE OF BIRTH

July 29, 1940

EDUCATION

M.A., Teachers College, Columbia University
Education of the Deaf, 1963

B.A., Queens College of the City University of New York
Hearing and Speech, 1962

CERTIFICATION

New York City
Teacher of the Deaf and Hard of Hearing

New York State
Teacher of the Deaf

PROFESSIONAL EXPERIENCE

Present	Assistant Professor of Clinical Pediatrics College of Physicians and Surgeons, Columbia University, 1973 Chief, Child Development Section Pediatric Service, The Roosevelt Hospital, 1974
1973	Assistant Director, Rubella Project The Roosevelt Hospital
1972-1969	New York University Medical Center-Bellevue Hospital Center, Department of Pediatrics, Rubella Project Assistant Director for Educational Services, Rubella Project, 1972 Director, Experimental Pre-School for Multihandicapped Children, 1971-Present Head Teacher, Experimental Pre-School for Multihandicapped Children, 1971-1969

1969-1964

New York City Board of Education

Itinerant Teacher: Infant Auditory Training Program

Hunter College Hearing and Speech Clinic, 1964

Jacobi Hospital Hearing and Speech Clinic, 1966

Bellevue Hospital Hearing and Speech Clinic, 1967

Elmhurst Hospital Hearing and Speech Clinic, 1967

Kings County Hearing and Speech Clinic, 1968

Teacher, School for Language and Hearing Impaired Children, 1965

Teacher, Rubella Nursery, Bellevue Hospital, 1969

ADDITIONAL

Instructor, Hunter College of the City University of New York, Institute of Health Sciences, Department of Speech Pathology and Audiology 1969, 1972

PROFESSIONAL ORGANIZATIONS

American Association on Mental Deficiency
Council for Exceptional Children

PROFESSIONAL ACTIVITIES

Department of Health, Education and Welfare Member, Task Force on the Mentally Retarded Deaf 1972-1973

Department of Health, Education and Welfare Advisory Committee, Mid-Atlantic (North) and Caribbean Regional Deaf-Blind Center, 1970-Present

Hunter College, Department of Special Education Advisory Committee, Alternate Strategies for the Preparation of Teachers of the Pre-School Handicapped 1971-1973

PUBLICATIONS

Infant Stimulation Programming for the Deaf-Blind, In The State of the Art; Deaf-Blind. Ed.: Lowell, E., Department of Health, Education and Welfare. (Publication date not set)

PRESENTATIONS

Interdisciplinary Evaluation of the Multihandicapped Child. San Juan, Puerto Rico. February 3, 1977.

Programming for the Severely Handicapped U.S. Virgin Islands. January 26-28, 1977.

Longitudinal Study of Children with Congenital Rubella Attending Schools for the Deaf. New York State Association of Educators of the Deaf. October 8, 1976.

Developmental Problems of Multiple Handicapped Children. Symposium sponsored by Department of Pediatrics, San Juan City Hospital and Department of Health of the Municipality of San Juan. April 19-20, 1976.

Identifying, Diagnosing, Treating Educationally Multihandicapped Infants: A Ten Year Overview. Council for Exceptional Children. April 8, 1976

Utilizing Services in the Handicapped Service Field. A workshop for the Office of Child Development Region II. Council for Exceptional Children. April 17, 1974

The Pre-School for Multihandicapped Children. Council for Exceptional Children. April 17, 1974

CURRICULUM VITAE - Neil Lombardi, M.D.

Date of Birth:	July 15, 1943
Education:	B.A., magna cum laude - Boston University 1967 Phi Beta Kappa M.D., cum laude - Boston University School of Medicine, 1967 Alpha Omega Alpha
Postgraduate Training:	New England Medical Center Hospitals - The Boston Floating Hospital Intern Straight Pediatrics 1967-68 The Boston Floating Hospital Residency Pediatrics, NEMCH 1968-70 The Boston Floating Hospital Fellowship, Special Clinical Fellowship in Pediatric Neurology sponsored by The National Institute of Neurological Diseases and Stroke, 1972-75
Academic Appointments:	College of Physicians & Surgeons of Columbia University Assistant Clinical Professor of Pediatrics 1976 Assistant Clinical Professor of Neurology 1976
Hospital Appointments:	The Roosevelt Hospital Assistant Attending Pediatrician (Child Neurology) 1975 St. Luke's Hospital Consulting Pediatrician (Neurology) 1976 Consulting Physician (Pediatric Neurology) 1976 Columbia Presbyterian Medical Center The Babies' Hospital, Assistant Attending Physician, Pediatrics 1977
Memberships:	Fellow American Academy of Pediatrics, 1973 Junior Member American Academy of Neurology 1973 Fellow Massachusetts Medical Society, Suffolk District, 1974
Military Service:	Major, USAF, Andrews AFB, Md., 1970-72 Staff Pediatrician
Licensure:	New York #123620 Massachusetts #31236 Maryland #D08966 National Board of Medical Examiners, 1968 American Board of Pediatrics, #15225, 1972

Publication: Lombardi, N., Rabe E.F., Flax, M.H., Chang T.,
Cerebrospinal Fluid Immunoglobulin G and Albumin Dynamics,
Pediatric Research, 11:37, 1977

Current Research: Co-Principal Investigator of a Research Project evaluating a developmental screening and test battery (SRS Grant #11-P-90244/2-01)

CURRICULUM VITAE: RITA H. FISCHER, M.D.

Date of Birth:	September 28, 1944
Birthplace:	Brooklyn, New York
Marital Status:	Single
Education:	B.A. Cum Laude -- Brooklyn College 1965 Major Subject: Chemistry Minor Subject: Education Scholarship: New York State Regents College M.D. - State University of New York Downstate Medical Center, College of Medicine 1970
Postgraduate Training:	Babies Hospital Columbia-Presbyterian Medical Center Internship - Straight Pediatrics 1970-1971 Babies Hospital Columbia-Presbyterian Medical Center Junior Resident 1971-1972 Roosevelt Hospital Senior Resident 1972-1973 Roosevelt Hospital Chief Resident, Pediatrics 1973-1974
Hospital Appointments:	Roosevelt Hospital Assistant Attending, Pediatric Service From July 1, 1974 -
Academic Appointment:	College of Physicians & Surgeons of Columbia University Instructor in Clinical Pediatrics (Part-time) 1974-

Other: New York City Board of Education
Jr. High School Teacher of Science
September 1965-June. 1966

Licensure: National Board of Medical Examiners July 1, 1971
New York State Medical License #109316
Issued July 19, 1971
American Board of Pediatrics: Part I (written)
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References: Louis Z. Cooper, M.D.
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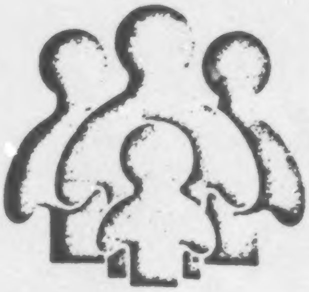
APPENDIX D

Contingency Intervention Project Brochure

CONTINGENCY INTERVENTION PROJECT

An Intervention System for Handicapped Infants and Children



Institute for the Study of Exceptional Children
Educational Testing Service
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Dr. Michael Lewis, Director

The contingency intervention project of the Institute for the Study of Exceptional Children has developed the hardware and software for an infancy learning curriculum. The curriculum focuses upon learning from very simple response-consequence relationships to more complex sequences of responses and discrimination learning tasks. The technology around which the system has been built offers the potential for considerable expansion of the complexity and nature of the learning opportunities available.

An Apple II microcomputer constitutes the major hardware for presenting information and storing the child's responses. Our Apple II models have 48K memory and have been modified to accept up to 8 input signals and can provide up to 8 outputs. Data files and programming logic are permanently stored on miniature floppy disks. The microcomputer, the disk drive and the circuitry for interfacing the Apple II with the child and with a variety of output devices fits into a conventional suitcase weighing approximately 35 pounds. Simple switch closures are required for input to the system.

The Theory

The contingency intervention project is based upon the generalized expectancy theory of infant learning (Lewis & Goldberg, 1969). From this perspective an infant learns not only specific behavioral patterns but also a general sense of competence in controlling his or her environment. This feeling of competence is a result of early action-consequence contingencies. From Piagetian, motivational, and psychosocial viewpoints the first and primary task that the infant has is learning how to engage and interact with his environment. These skills are the forerunners of all subsequent learning and are the basis for the infant's sustained attempts to engage the environment. Indeed, if the infant does not experience action-outcome contingencies early, a sense of "learned helplessness" (Seligman, 1975) may result. That is, the infant may lose interest in the environment because his activity has been superfluous to it.

The generalized expectancy theory and the possibility of learned helplessness have particular relevance to the development of handicapped infants. There are two major reasons that handicapped infants may have a prolonged period of contingency deprivation. *First*, because most early handicapping conditions have a considerable motor component, infants may not be able to engage the environment because they lack the necessary movements to do so. In order to overcome the problem of motor delay it may be necessary to arrange a very sensitive environment which reacts to the simple movements of which an infant is capable.

The *second* factor which might delay the handicapped infant's acquisition of a generalized expectancy of competence is found in the social environment. The birth of a child with known handicaps has a traumatic effect upon the child's family. This effect is often compounded by advice which counsels the parents not to expect much of their child. The systematic attempt to lower parents' expectations regarding their child's development could significantly change the way they would normally interact with their child. This could produce a reduction in social contingencies which has been regarded by many as the cradle of meaning (Lewis & Freedle, 1973). In order to overcome such negative expectancies, demonstration of the infant's learning abilities may be a critical tool. Moreover, such demonstration would ideally involve provision of an action-consequence contingency and immediate feedback to parents regarding the infant's performance in the learning situation. All too often in intervention programs the child's performance data disappear to a professional's desk to be analyzed and program revisions are forthcoming days or weeks later. A system which allows rapid analysis of data immediately after the child's performance would enable parents to participate in the decision-making process and generate an active and conscious involvement in facilitating the infant's development.

Purpose of the Contingency Intervention Curriculum

The contingency intervention curriculum is designed to provide handicapped infants with learning situations which foster an awareness of their own abilities to control their environment. The steps in the curriculum cover the developmental range from primary circular reactions to simple means-ends behavior (Piaget, 1952). The concepts in this developmental hierarchy might be stated from the infant's point of view as the following:

1. I can make things happen (but I don't know how I did it)—Primary Circular Reaction
2. I can do this response to make this event happen—Secondary Circular Reaction

3. This response can make a variety of different things happen—Elaboration of Secondary Circular Reactions
4. Other responses can make a variety of things happen—Elaboration of Secondary Circular Reactions
5. These responses are tools for finding out what will happen—Coordination of Secondary Circular Reactions and their application to new situations
6. Different combinations of responses lead to different kinds of information.

Normally this developmental hierarchy is completed in the first year of life. However, some severely handicapped children have not exhibited such sensorimotor skills after three or four years of life. Generally such children have very limited response repertoires and often have one or more sensory deficits. Because of these limitations, such children may lose interest in those aspects of the world which they could control if given the opportunity. They have learned to be helpless because of a life history in which they did not exert much control.

The contingency intervention curriculum is a system which enables the teacher to examine carefully those movements and those consequences which could be related. The learning task for the child is to relate those possible movements to available consequences. The microcomputer provides a behavioral microscope for identification of contingencies which a child could learn.

The curriculum consists of two packages. First it provides a set of programs which control different contingencies of various complexity. These contingencies are parallel to the levels of complexity in development from primary circular reactions to means-ends behavior. The second package provides a variety of ways of looking at a child's behavior. This group of programs analyzes data and provides hard copy printed summaries or high resolution graphic displays of child performance.

These programs can also be used as a tool in teaching parents how to analyze their own child's behavior.

Components of the Contingency Intervention System

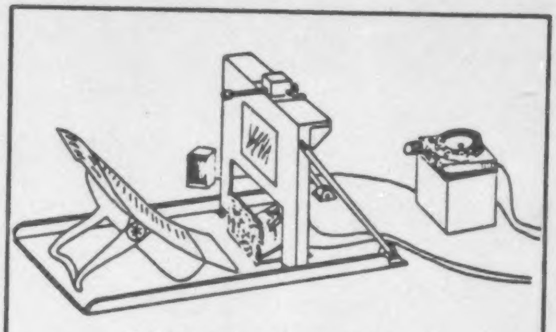
The contingency intervention system consists of four major components:

1. A playspace within which a variety of responses are possible and from which a variety of consequences can be provided.

2. Input devices for translating a child's movements into simple switch closures.
3. Output devices for providing a variety of visual, auditory, and tactile consequences.
4. An Apple II microcomputer which provides a logical interface for relating input to output, for recording events and for analyzing data.

Play environment. The play environment which has been used thus far is depicted below. The child is seated on the platform in an infant seat, on a foam rubber mat, bean bag chair or other type of postural support. The frame provides a mount for a footpanel, levers, hi-fidelity speakers, a rear projection screen, and various mechanical toys. A wide range of children from moderately handicapped Down's Syndrome infants to multiply-handicapped deaf/blind infants have experienced contingencies of reinforcement in a playspace such as depicted.

Alternative positioning arrangements may be necessary for some orthopedically handicapped infants. We are exploring design changes in the playspace for various populations of children as we work with them.



Contingency Reinforcement Playspace

Input devices. Simple switch closure is required as input to the contingency intervention system. A variety of switches have been used with severely handicapped children by Zuromski (1979) and others to reinforce such diverse behaviors as grasping, head raising, arm movement, kicking, pulling and wrist rotation. Any of these switches would be compatible with the present contingency intervention system.

In addition we have used simple button boxes which enable observers to record the frequency and duration of a variety of behaviors. Up to 256 such behavioral codes are possible although we have found it more practical to work with only six such codes at one time. These are smiling, crying, vocalization, attention, primary circular reaction, and distraction. Any one of these observational codes can be linked to a separate contingency of reinforcement.

Two button boxes can be used simultaneously by different observers and the computer can provide analyses for interobserver agreement between them.

Output devices. Any common electrical device can be used to provide consequences. Modifications have been made on some common battery operated toys (e.g., Mattel's Tunneyville Choo Choo). Devices which we have found to provide useful consequences have been cassette tape recorders, carousel slide projectors, vibrating pads, electrical fans, electric lights, and a locally developed "peek-a-boo." The latter is a drawing of a human face which pops up when the appropriate response is made. Audiotapes of the mother's voice have been a particularly effective reinforcer for several children.

Microcomputer Programs Available

Two types of computer programs have been developed for the contingency intervention system: (1) control programs, and (2) analysis programs. The control programs provide the logic for arranging outputs contingent upon inputs and for recording the data. The analysis programs provide a variety of summaries of a child's learning session. The major analysis programs provide: (1) hard copy printouts of session data; (2) high resolution graphics; and (3) computation of agreement between two observers coding the child's behavior.

Control Programs

Two major control programs have been used. The first, the criteria program, arranges contingencies for up to two separate responses and analyzes the rate of up to three separate behaviors. The second control program, the sequence program, provides feedback contingent upon some pattern of behaviors.

Criteria program. The criteria program can control two independent contingencies and arrange for changes in these contingencies when there are changes in the rate of any of three behaviors. This program controls contingencies from one simple response-feedback arrangement (e.g., kicking produces music on a schedule of one kick per burst of music) to simultaneous contingencies which change in the course of a session. A criterion can be set which states some change in contingency as a result of a change in the rate of one of three behaviors. Frequency or duration of behavior can be used as the value within these criteria. The rates of behavior can be used as criteria to change (a) the type of feedback to the child, (b) the schedule of reinforcement, or (c) the behavior to be reinforced. Any one of eight contingency changes can be related to a given criterion. Since the program is written in machine language, it takes the microcomputer only ¼ of a second to analyze up to 3 rates of behavior to determine if a criterion has been met and to make the appropriate contingency change. The rate of behavior can be analyzed using from 1s. to 240s. as the divisor of the frequency/time equation.

The criteria program has been used (1) to change types of reinforcement when responding fell to baseline ratio (e.g., satiation); (2) to change schedules of reinforcement when responding had achieved a certain rate; and (3) to increase the rate of one response while simultaneously decreasing the rate of a competing behavior.

To illustrate the possibilities of the criteria program, consider a multiply-handicapped child for whom the experience of a contingency between his behavior and feedback is an important goal. Suppose it had been determined that the child could move his foot without going into total reflexive extension, but generally did not modulate his foot movements to prevent such extension. The criteria program could be used so that an observer's coding of extension was the criterion for a change in schedule to no reinforcement.

Thus, foot movements would produce reinforcement only if they were not accompanied by extension of other limbs.

The parameters of the criteria program allow one to select two channels (from a total of 64) both of which can be associated with a separate contingency of reinforcement. Different criteria can be associated with each separate contingency of reinforcement.

The criteria analyses can be delayed so the child has some experience with a particular contingency before the contingency is changed. A specific number of responses (up to 240) can be chosen as the criterion value and these can be analyzed across a variable time span (from 1 to 240s.). The change in contingency can be programmed for instances in which the number of responses per unit time either exceeds or falls below the criterion value. Once a criterion is met, the new contingency is in operation until a subsequent criterion is met. Since criteria can be linked to one another, program loops of contingency changes can be arranged.

Sequence program. This program allows the user to specify a pattern of up to 8 units consisting of any of four responses. For example, reinforcement could be programmed for the sequence: (1) raises head; (2) orients eyes to screen; (3) pulls; and (4) vocalizes which produces a movie with sound track. This program is appropriate for the higher levels of the curriculum in which the child is learning to use his behaviors as tools which can be recombined in different ways to achieve different ends.

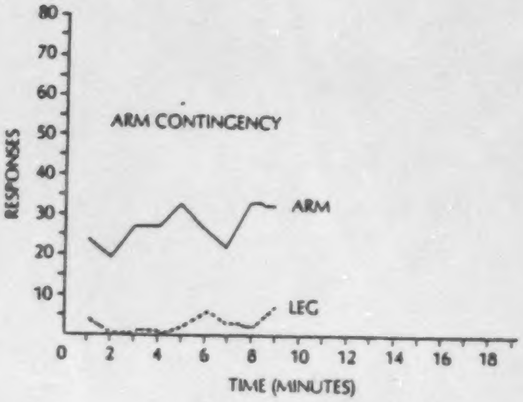
Analysis Programs

Four major programs are available for analyzing data generated from the contingency intervention. These programs are:

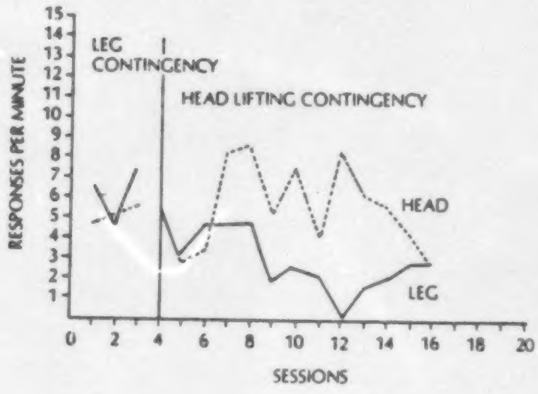
1. The summary printout program
2. The sequence printout program
3. The high resolution graphics program
4. Interobserver agreement programs

The printout programs interface with a Deckwriter II (Digital Equipment Corporation) via an LSR 256 communication card within the Apple II microcomputer.

The summary printout program. The summary printout program provides minute by minute analysis of each input channel, each output channel and each observational code. Both frequency and duration measures are provided for four response input channels, four reinforcement output channels and six observational code channels. The frequency and duration of each observational code for each of two observers is provided for sessions in which two observers were present for reliability purposes.



Sequence printout program. This program prints out the time at which each of several responses or consequences occurred. This enables the user to analyze for temporal and sequential patterns of responding and to determine if the responses or their timing change at various points in the contingency intervention curriculum. This program is especially important to determine whether the infant systematically uses the responses which have functioned as operants in the past to explore new contingencies of reinforcement.



High resolution graphics program. The high resolution graphics program enables the user to produce publication quality graphs from data directly accessed on binary files stored on floppy diskettes. Thus, no key entry of data is necessary as in other commercially available graphics programs such as Appleplot. A standard 16 by 18 unit graph is constructed with a variable ordinate scale option. That is, depending upon the child's rate of behavior, the ordinate can be scaled with sixteen units with a maximum value of between 8 and 280. Graphs can plot data either in total responses per minute or in cumulative records. The cumulative records add the total responses in a minute to the cumulative total of responses up to that minute. The program summarizes the data loaded from the session file to assist the user in selecting a scale appropriate to the range of behavior within a given session. This summary gives the maximum number of responses per minute for each of the responses analyzed to assist in selection of a scale for noncumulative minute-by-minute response frequency graphs. The summary also provides the total number per session of each of the analyzed response to assist in selecting a scale value for a cumulative record. Up to eight different variables can be analyzed for inclusion in a single graph. These variables can include any combination of measures of child response, observational codes, and reinforcement. Either frequency or duration measures can be selected for these analyses.

A moveable cursor enables the user to put any kind of character (including labels) at any point on the graph. The characters can be created with a separate program and can be permanently stored for use within the high resolution graphics program. One character set which is available contains all the upper case letters of the alphabet as well as some other useful keyboard entries. The moving cursor can also be used to erase any points on the graph or to highlight any points on the graph.

A title can be written on any graph and the graph itself can be permanently stored on a floppy diskette. Additional curves can be added at a later date to any permanently stored graph.

Interobserver agreement. The interobserver agreement program compares the frequency of each observational code for two observers. It also provides the duration of continuous recording of each observational code for each observer. Events are defined in terms of continuous recording of a behavior with no interruption. If an observer stops recording an event for ¼ second and resumes recording that same code, this is counted as two events. The interobserver agreement program makes paired comparisons between two observers for every ¼ second location in the session file. For events, the program provides the total number of each observational code for observer A, the total number of each observational code for observer B, and the total number of coincidental occurrences of each code for A and B. For the duration measure, the interobserver agreement program provides the total on-time for each code for observer B, and the total time during which both A and B recorded each code. From these data reliability coefficients such as Cohen's Kappa or percentage agreement can be computed.

The program also allows the user to specify certain criteria for determining events. Thus, the program can eliminate codings of behavioral states (e.g., attention, distraction) which are less than one second duration. The program can also consider two events separated by less than a 3-second interruption as one event. Thus, some problems of observers being slightly out of phase can be edited from the data if interobserver reliability criteria do not require paired comparisons of quarter-second units.

At this point the program does not provide hard copy printout of the reliability coefficients. However, it could easily be modified to do so for various local printer arrangements.

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Bibliography

Brinker, R. & Lewis, M. Patterns of learning by handicapped infants. Paper presented in a symposium on the Social Interaction and Learning of Handicapped Babies at the Biennial Meeting of the Society for Research in Child Development. Boston, Massachusetts, April 1981.

Brinker, R. & Lewis, M. Intervening in the motivational systems of handicapped infants: A process approach with product implications. Paper presented at the 59th Annual Convention of the Council for Exceptional Children. New York, April 1981.

Lewis, M. & Goldberg, S. Perceptual-cognitive development in infancy: A generalized expectancy model as a function of the mother-infant interaction. *Merrill-Palmer Quarterly*, 1969, *15* (1), 81-100.

Lewis, M. & Freedle, R. The mother-infant dyad: The cradle of meaning. In P. Pliner, L. Kramer, & T. Alloway (Eds.),. *Communication and affect: Language and thought*. New York: Academic Press, 1973.

Robinson, C. & Robinson, J. Sensorimotor functions and cogntive development. In M. Snell (Ed.) *Systematic instruction of the moderately and severely handicapped*. Columbus: Charles E. Merrill, 1978.

Seligman, M. *Helplessness: On depression, development and death*. San Francisco: W. H. Freeman, 1975.

Watson, J. S. Memory and "contingency analysis" in infant learning. *Merrill-Palmer Quarterly*, 1967, *13*, 55-76.

Zuromski, E. The concept of active stimulation. Paper presented at the Sixth Annual Conference of the Association for the Severely Handicapped. Chicago, October 1979.

7670401 • SS1P1 • Printed in U.S.A.

APPENDIX E

Questionnaires

Preschool Longitudinal Study

Competency Assessment Project Follow-up

1. Carey Temperament Scale
2. Family Environment Scale (Moos)
3. Social Network Inventory
4. Parent Expectations Questionnaire
5. Achenbach Child Behavior Questionnaire
6. Family Life Events Scale
7. Friendship Questionnaire
8. Parent Questionnaire
9. Home Observation for Measurement of the Environment
10. Examiner Rating Scale
11. CAP Language Scale

PRESCHOOL LONGITUDINAL STUDY S#____________

Behavioral Style Questionnaire

McDevitt and Carey

Child's name: ________________________________

Date that rating was made: ________________________

We are interested in the behavioral style that your child exhibits. Please rate your child on the following 100 items. Base your ratings on the child's recent and current behavior (last three months). Please try to rate every item. Consider only your own impressions and observations of the child. There are no right and wrong answers. Every child's behavioral style is unique.

Please keep in mind that this cover sheet will be replaced by your child's identification number so that your responses will remain anonymous.

A few items may not be appropriate for your child. Place an "X" in the space for those items.

Subject Number ____________

Date ____________

USING THE SCALE SHOWN BELOW, PLEASE PLACE THE NUMBER IN THE SPACE BY EACH ITEM THAT TELLS HOW OFTEN THE CHILD'S RECENT AND CURRENT BEHAVIOR HAS BEEN LIKE THE BEHAVIOR DESCRIBED BY EACH ITEM.

Almost never	Rarely	Usually does not	Usually does	Frequently	Almost always	Not Appropri
1	2	3	4	5	6	X

_____ 1. The child is moody for more than a few minutes when corrected or disciplined.

_____ 2. The child seems not to hear when involved in a favorite activity.

_____ 3. The child can be coaxed out of a forbidden activity.

_____ 4. The child runs ahead when walking with the parent.

_____ 5. The child laughs or smiles while playing.

_____ 6. The child moves slowly when working on a project or activity.

_____ 7. The child responds intensely to disapproval.

_____ 8. The child needs a period of adjustment to get used to changes in school or at home.

_____ 9. The child enjoys games that involve physical activities.

_____ 10. The child is slow to adjust to changes in household rules.

_____ 11. The child has bowel movements at about the same time each day.

_____ 12. The child is willing to try new things.

_____ 13. The child sits calmly while watching TV or listening to music.

_____ 14. The child leaves or wants to leave the table during meals.

_____ 15. Changes in plans bother the child.

_____ 16. The child notices minor changes in mother's dress or appearance (clothing, hairstyle, etc.).

_____ 17. The child does not acknowledge a call to come in or to stop an activity if involved in something.

_____ 18. The child responds to mild disapproval by the parent (a frown or shake of the head).

_____ 19. The child settles arguments with playmates within a few minutes.

_____ 20. The child shows strong reaction to things, both positive and negative.

Almost never	Rarely	Usually does not	Usually does	Frequently	Almost always	Not Appropri
1	2	3	4	5	6	X

_____21. The child had trouble leaving the mother the first three days when he/she entered school or when he/she changed schools.

_____22. The child picks up the nuances or subtleties of parental explanations (example: implied meanings).

_____23. The child falls asleep as soon as he/she is put to bed.

_____24. The child moves about actively when he/she explores new places.

_____25. The child likes to go to new places rather than familiar ones.

_____26. The child sits quietly while waiting.

_____27. The child spends over an hour reading a book or looking at the pictures.

_____28. The child learns new things at his/her level quickly and easily.

_____29. The child smiles or laughs when he/she meets new visitors at home.

_____30. The child is easily excited by praise.

_____31. The child is outgoing with strangers.

_____32. The child fidgets when he/she has to stay still.

_____33. The child says that he/she is "bored" with his/her toys and games.

_____34. The child is annoyed at interrupting play to comply with a parental request.

_____35. The child practices an activity until he/she masters it.

_____36. The child eats about the same amount at supper from day to day.

_____37. Unusual noises (sirens, thunder, etc.) interrupt the child's behavior.

_____38. The child complains when tired.

_____39. The child loses interest in a new toy or game the same day.

_____40. The child becomes engrossed in an interesting activity for one half hour or more.

_____41. The child cries intensely when hurt.

Almost never	Rarely	Usually does not	Usually does	Frequently	Almost always	Not Appropri
1	2	3	4	5	6	X

_____42. The child reacts strongly to kidding or light-hearted comments.

_____43. The child approaches children his/her age that he/she doesn't know.

_____44. The child plays quietly with his/her toys and games.

_____45. The child is outwardly expressive of his/her emotions.

_____46. The child is enthusiastic when he/she masters an activity and wants to show everyone.

_____47. The child is sleepy at his/her bed-time.

_____48. The child stops an activity because something else catches his/her attention.

_____49. The child is hungry at dinner time.

_____50. The child holds back until sure of himself/herself.

_____51. The child looks up when someone walks past the door-way.

_____52. The child becomes upset if he/she misses a regular television program.

_____53. The child reacts strongly (cries or complains) to a disappointment or failure.

_____54. The child accepts new foods within one or two tries.

_____55. The child has difficulty getting used to new situations.

_____56. The child will avoid misbehavior if punished firmly once or twice.

_____57. The child is sensitive to noises (telephone, doorbell) and looks up right away.

_____58. The child prefers active outdoor play to quiet play inside.

_____59. The child dislikes milk or other drinks if not ice-cold.

_____60. The child notices differences or changes in the consistency of food.

_____61. The child adjusts easily to changes in his/her routine.

_____62. The child eats about the same amount at breakfast from day to day.

_____63. The child seems to take setbacks in stride.

_____64. The child cries or whines when frustrated.

_____65. The child repeats behavior for which he/she has previously been punished.

Almost never	Rarely	Usually does not	Usually does	Frequently	Almost always	Not Appropr:
1	2	3	4	5	6	X

_____66. The child looks up from playing when the telephone rings.

_____67. The child is willing to try new foods.

_____68. The child needs encouragement before he/she will try new things.

_____69. The child cries or whines when ill with a cold or upset stomach.

_____70. The child runs to get where he/she wants to go.

_____71. The child's attention drifts away or lapses when listening to parental instructions.

_____72. The child becomes angry with one of his/her playmates.

_____73. The child is reluctant to give up when trying to do a difficult task.

_____74. The child reacts to mild approval from the parent (a nod or smile).

_____75. The child requests "something to eat" between meals and regular snacks.

_____76. The child rushes to greet the parent or greets loudly after absence during the day.

_____77. The child looks up when he/she hears voices in the next room.

_____78. The child protests when denied a request by the parent.

_____79. The child ignores loud noises when reading or looking at pictures in a book.

_____80. The child dislikes a food that he/she had previously seemed to accept.

_____81. The child stops what he/she is doing and looks up when the parent enters the room.

_____82. The child cries for more than a few minutes when hurt.

_____83. The child watches a long (1 hour or more) TV program without getting up to do something else.

_____84. The child spontaneously wakes up at the usual time on weekends and holidays.

_____85. The child responds to sounds or noises unrelated to his/her activity.

_____86. The child avoids new guests or visitors.

_____87. The child fidgets when a story is being read to him/her.

Almost never	Rarely	Usually does not	Usually does	Frequently	Almost always	Not Appropri
1	2	3	4	5	6	X

_____88. The child becomes upset or cries over minor falls or bumps.

_____89. The child interrupts an activity to listen to conversation around him/her.

_____90. The child is unwilling to leave a play activity that he/she has not completed.

_____91. The child is able to fall asleep when there is conversation in a nearby room.

_____92. The child becomes highly excited when presented with a new toy or game.

_____93. The child pays attention from start to finish when the parent tries to explain something to him/her.

_____94. The child speaks so quickly that it is sometimes difficult to understand him/her.

_____95. The child wants to leave the table during meals to answer the doorbell or phone.

_____96. The child complains of events in school or with playmates that day.

_____97. The child frowns when asked to do a chore by the parent.

_____98. The child tends to hold back in new situations.

_____99. The child laughs hard while watching television cartoons or comedy.

_____100. The child has "off" days when he/she is moody or cranky.

68. In our family each person has different ideas about what is right and wrong.
69. Each person's duties are clearly defined in our family.
70. We can do whatever we want to in our family.
71. We really get along well with each other.
72. We are usually careful about what we say to each other.
73. Family members often try to one-up or out-do each other.
74. It's hard to be by yourself without hurting someone's feelings in our household.
75. "Work before play" is the rule in our family.
76. Watching T.V. is more important than reading in our family.
77. Family members go out a lot.
78. The Bible is a very important book in our home.
79. Money is not handled very carefully in our family.
80. Rules are pretty inflexible in our household.
81. There is plenty of time and attention for everyone in our family.
82. There are a lot of spontaneous discussions in our family.
83. In our family, we believe you don't ever get anywhere by raising your voice.
84. We are not really encouraged to speak up for ourselves in our family.
85. Family members are often compared with others as to how well they are doing at work or school.
86. Family members really like music, art and literature.
87. Our main form of entertainment is watching T.V. or listening to the radio.
88. Family members believe that if you sin you will be punished.
89. Dishes are usually done immediately after eating.
90. You can't get away with much in our family.

FAMILY ENVIRONMENT SCALE

FORM R

RUDOLF H. MOOS

INSTRUCTIONS

There are 90 statements in this booklet. They are statements about families. You are to decide which of these statements are true of your family and which are false. Make all your marks on the separate answer sheets. If you think the statement is *True* or mostly *True* of your family, make an X in the box labeled T (true). If you think the statement is *False* or mostly *False* of your family, make an X in the box labeled F (false).

You may feel that some of the statements are true for some family members and false for others. Mark T if the statement is *true* for most members. Mark F if the statement is *false* for most members. If the members are evenly divided, decide what is the stronger overall impression and answer accordingly.

Remember, we would like to know what your family seems like to *you*. So *do not* try to figure out how other members see your family, but *do* give us your general impression of your family for each statement.

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1. Family members really help and support one another.
2. Family members often keep their feelings to themselves.
3. We fight a lot in our family.
4. We don't do things on our own very often in our family.
5. We feel it is important to be the best at whatever you do.
6. We often talk about political and social problems.
7. We spend most weekends and evenings at home.
8. Family members attend church, synagogue, or Sunday School fairly often.
9. Activities in our family are pretty carefully planned.
10. Family members are rarely ordered around.
11. We often seem to be killing time at home.
12. We say anything we want to around home.
13. Family members rarely become openly angry.
14. In our family, we are strongly encouraged to be independent.
15. Getting ahead in life is very important in our family.
16. We rarely go to lectures, plays or concerts.
17. Friends often come over for dinner or to visit.
18. We don't say prayers in our family.
19. We are generally very neat and orderly.
20. There are very few rules to follow in our family.
21. We put a lot of energy into what we do at home.
22. It's hard to "blow off steam" at home without upsetting somebody.
23. Family members sometimes get so angry they throw things.
24. We think things out for ourselves in our family.
25. How much money a person makes is not very important to us.
26. Learning about new and different things is very important in our family.
27. Noboby in our family is active in sports, Little League, bowling, etc.
28. We often talk about the religious meaning of Christmas, Passover, or other holidays.
29. It's often hard to find things when you need them in our household.
30. There is one family member who makes most of the decisions.
31. There is a feeling of togetherness in our family.
32. We tell each other about our personal problems.
33. Family members hardly ever lose their tempers.
34. We come and go as we want to in our family.
35. We believe in competition and "may the best man win."
36. We are not that interested in cultural activities.
37. We often go to movies, sports events, camping, etc.
38. We don't believe in heaven or hell.
39. Being on time is very important in our family.
40. There are set ways of doing things at home.
41. We rarely volunteer when something has to be done at home.
42. If we feel like doing something on the spur of the moment we often just pick up and go.
43. Family members often criticize each other.
44. There is very little privacy in our family.
45. We always strive to do things just a little better the next time.
46. We rarely have intellectual discussions.
47. Everyone in our family has a hobby or two.
48. Family members have strict ideas about what is right and wrong.
49. People change their minds often in our family.
50. There is a strong emphasis on following rules in our family.
51. Family members really back each other up.
52. Someone usually gets upset if you complain in our family.
53. Family members sometimes hit each other.
54. Family members almost always rely on themselves when a problem comes up.
55. Family members rarely worry about job promotions, school grades, etc.
56. Someone in our family plays a musical instrument.
57. Family members are not very involved in recreational activities outside work or school.
58. We believe there are some things you just have to take on faith.
59. Family members make sure their rooms are neat.
60. Everyone has an equal say in family decisions.
61. There is very little group spirit in our family.
62. Money and paying bills is openly talked about in our family.
63. If there's a disagreement in our family, we try hard to smooth things over and keep the peace.
64. Family members strongly encourage each other to stand up for their rights.
65. In our family, we don't try that hard to succeed.
66. Family members often go to the library.
67. Family members sometimes attend courses or take lessons for some hobby or interest (outside of school).

SOCIAL NETWORK INVENTORY

This inventory is a listing, in categories, of people whom your child knows.

Your Child's Name ______________________________

Today's Date ______________________________

Subject Number ______________________________

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(Lewis & Feiring, 1982)

FOR THIS PART OF THE QUESTIONNAIRE, PLEASE LIST PEOPLE IN TERMS OF THEIR RELATIONSHIP TO YOUR CHILD.

A. Child's friends who are also children. Please indicate relationship to child (for example: schoolmate, neighbor, friend, cousin).

Name or Initials	Sex	Approximate Age	Relationship to Child	Contact with your preschooler: face to face, phone, or letter				
				daily	at least once a week	at least once a month	at least once every 6 months	at least once a year

B. Important adults for your child. Please indicate relationship to child (for example: babysitter, neighbor, teacher, adult friend)

Name or Initials	Sex	Approximate Age	Relationship to Child	Contact with your preschooler: face to face, phone or letter				
				daily	at least once a week	at least once a month	at least once every 6 months	at least once a year

FOR THIS PART OF THE QUESTIONNAIRE, PLEASE LIST PEOPLE IN TERMS OF THEIR RELATIONSHIP TO YOU. BUT PLEASE MENTION ONLY PEOPLE YOUR CHILD KNOWS.

A. Immediate family and any others living in household with you. Please list your 6-year-old first, and include yourself.

Name or Initials	Sex	Approximate Age	Relationship to You	Contact with your preschooler: face-to-face, phone, or letter				
				daily	at least once a week	at least once a month	at least once every 6 months	at least once a year

B. Relatives known by the child. Again, please list relationships to you (for example: my sister, husband's sister, wife of h.'s(husband's) brother, niece, nephew, my cousin, my mother).

Name or Initials	Sex	Approximate Age	Relationship to You	Contact with your preschooler: face-to-face, phone, or letter				
				daily	at least once a week	at least once a month	at least once every 6 months	at least once a year

C. Adult friends of the parents known by the child. Please indicate relationships to you and spouse (for example: my girlfriend, girlfriend's husband, neighbor, husband's friend, etc.).

Name or Initials	Sex	Approximate Age	Relationship to You	Contact with your preschooler: face-to-face, phone, or letter				
				daily	at least once a week	at least once a month	at least once every 6 months	at least once a year

Name or Initials	Sex	Approximate Age	Relationship to You	Contact with your preschooler: face-to-face, phone, or letter				
				Daily	at least once a week	at least once a month	at least once every 6 months	at least once a year

D. Co-workers. Please list whether they work with you or with spouse (for example: husband's boss). Also, please put check mark next to names of those known by the child.

E. Deceased persons. Please list people important to your family who are no longer alive. Give relationships to you (for example: my aunt, husband's father.) Also, please put check mark next to names of those whom the child knew.

F. Anyone else known by the child, not in another category. Please make relationship to you and child clear.

(Brooks-Gunn & Wehren, 1982)

PRESCHOOL LONGITUDINAL STUDY

Subject number__________

Date ________________

PARENT EXPECTATIONS

The following is a list of situations that children may be expected to manage at different ages. Please indicate with a check mark (✓) in the appropriate box the age at which you would expect your child to perform each activity. If an activity is not applicable to your child, check the column marked N/A. There are no "right" or "wrong" answers as people have different expectations for their particular child. All responses will remain anonymous.

Age in Years

	0-1	1-2	3-4	5-6	7-8	9-10	11-12	13-14	15+	N/A
1. Be able to wash hands and face.										
2. Stop sucking thumb.										
3. Not play with food.										
4. Be polite and considerate to adults.										
5. Play cooperatively with other children										
6. Put toys away when finished.										
7. Be able to button clothes.										
8. Stay home alone.										
9. No longer clings to parents.										
10. Do household chores, i.e., make bed, put away clothes.										
11. Keep room neat.										
12. Not eat with fingers.										
13. Not have temper tantrums.										

(continued)

PARENT EXPECTATIONS (continued)

Age in Years

	0-1	1-2	3-4	5-6	7-8	9-10	11-12	13-14	15+	N/A
14. Not cry to get what he/she wants.										
15. Have appropriate table manners, i.e., use fork, napkin										
16. Decide what clothes to wear.										
17. Not cry over minor disappointments.										
18. Begin to read.										
19. Use toilet by self. 1. urinate 2. defecate										
20. Earn own spending money.										
21. Begin to print.										
22. Play away from home.										
23. Bathe without an adult.										
24. Not interrupt others talking.										
25. Ride a bicycle (two-wheeler).										
26. Watch TV.										
27. Have his first book.										

CHILD BEHAVIOR CHECKLIST FOR AGES 4-16

Child's Name ____________________ Today's Date __________

Sex_____ Age _____ Boy _____ Girl _____

Child's Birthdate Mo.____Day____Yr.____

This form filled out by: _____Mother _____Father _____Other (Specify):__________

1. Please list your child's favorite physical activitites.

____

____

____

None______________

2. Please list your child's favorite hobbies, and games. (Do not include T.V.)

____

____

____

None ______________

3. Please list any organizations, clubs, or groups your child belongs to.

____

____

____

None ______________

(Achenbach, 1975)

4. Please list any jobs or chores your child has. For example: raking leaves, picking up toys, making bed, etc.

____

____

____

None _______________

5. (a) About how many close friends does your child have?

None _____ 1 _____ 2 or 3 _____ 4 or more _____

(b) About how many times a week does your child do things with them?

less than 1 _____ 1 or 2 _____ 3 or more _____

6. Compared to other children of his/her age, how well does your child:

	Worse	About the same	Better
a. Get along with his/her brothers & sisters?	_____	_____	_____
b. Get along with other children?	_____	_____	_____
c. Behave with his/her parents?	_____	_____	_____
d. Play and work by himself/herself?	_____	_____	_____

7. Is your child in a special class? No _____ Yes _____

8. Below is a list of items that describe children. For each item that describes your child now or within the past 6 months, please circle the 2 if the item is very true or often true of your child. Circle the 1 if the item is somewhat or sometimes true of your child. If the item is not true of your child, circle the 0.

0 1 2 1. Allergy (describe): ____________________

0 1 2 2. Stubbornness

0 1 2 3. Asthma

0 1 2 4. Behaves like opposite sex

0 1 2 5. Can't concentrate, can't pay attention for long

0 1 2 6. Can't sit still, restless, or hyperactive

0 1 2 7. Clings to adults or too dependent

0 1 2 8. Complains of loneliness

0 1 2 9. Confused or seems to be in a fog

0 1 2 10. Cries a lot

0 1 2 11. Cruel to animals

0 1 2 12. Cruelty, bullying, or meanness to others

0 1 2 13. Day-dreams or gets lost in his/her thoughts

0 1 2 14. Deliberately harms self or attempts suicide

0 1 2 15. Demands a lot of attention

0 1 2 16. Destroys his/her own things

0 1 2 17. Destroys things belonging to his/her family or other children

0 1 2 18. Disobedient at home

0 1 2 19. Disobedient at school

0 1 2 20. Doesn't eat well

0 1 2 21. Doesn't get along with other children

0 1 2 22. Doesn't seem to feel guilty after misbehaving

0 1 2 23. Easily jealous

0 1 2 24. Eats or drinks things that are not food (describe): ____________________

0 1 2 25. Fears certain animals, situations, or places, other than school (describe): ____________________

0 1 2 26. Fears going to school

0 1 2 27. Fears he/she might think or do something bad

0 1 2 28. Feels he/she has to be perfect

0 1 2 29. Feels or complains that no one loves him/her

0 1 2 30. Feels others are out to get him/her

0 1 2 31. Feels worthless or inferior

0 1 2 32. Gets hurt a lot, accident-prone

0 1 2 33. Gets in many fights

0 1 2 34. Gets teased a lot

0 1 2 35. Hears things that aren't there (describe): ____________________

____

0 1 2 36. Impulsive or acts without thinking

0 1 2 37. Likes to be alone

0 1 2 38. Lying or cheating

0 1 2 39. Bites fingernails

0 1 2 40. Nervous, highstrung, or tense

0 1 2 41. Nervous movements or twitching (describe): ____________________

____

0 1 2 42. Nightmares

0 1 2 43. Not liked by other children

0 1 2 44. Constipated, doesn't move bowels

0 1 2 45. Too fearful or anxious

0 1 2 46. Feels dizzy

0 1 2 47. Feels too guilty

0 1 2 48. Overeating

0 1 2 49. Overtired

0 1 2 50. Overweight

0 1 2 51. Physical problems without known medical cause:

0 1 2 a. Aches or pains

0 1 2 b. Headaches

0 1 2 c. Nausea, feels sick

0 1 2 d. Problems with eyes (describe): ____________________

____

0 1 2 e. Rashes or other skin problems

0 1 2 f. Stomachaches or cramps

0 1 2 g. Vomiting, throwing up

0 1 2 h. Other (describe): ____________________

0 1 2 52. Physically attacks people

0 1 2 53. Picks nose, skin, or other parts of body (describe): ____________________

____

0 1 2 54. Plays with own sex parts in public

0 1 2 55. Plays with own sex parts too much

0 1 2 56. Poorly coordinated or clumsy

0 1 2 57. Prefers playing with older children

0 1 2 58. Prefers playing with younger children

0 1 2 59. Refuses to talk

0 1 2 60. Repeats certain acts over and over; compulsions (describe): ____________
____

0 1 2 61. Screams alot

0 1 2 62. Secretive, keeps things to self

0 1 2 63. Sees things that aren't there (describe): ____________
____

0 1 2 64. Self-conscious or easily embarrassed

0 1 2 65. Sets fires

0 1 2 66. Sexual problems (describe): ____________
____

0 1 2 67. Showing off or clowning

0 1 2 68. Shy or timid

0 1 2 69. Sleeps less than most children

0 1 2 70. Sleeps more than most children during day and/or night (describe):
____

0 1 2 71. Smears or plays with bowel movements

0 1 2 72. Speech problem (describe): ____________
____

0 1 2 73. Stares blankly

0 1 2 74. Steals at home

0 1 2 75. Steals outside the home

0 1 2 76. Stores up things he/she doesn't need (describe): ____________
____

0 1 2 77. Strange behavior (describe): ____________
____

0 1 2 78. Strange ideas (describe): ____________
____

0 1 2 79. Stubborn, sullen or irritable

0 1 2 80. Sudden changes in mood or feelings

0 1 2 81. Sulks a lot

0 1 2 82. Suspicious

0 1 2 83. Talks or walks in sleep (describe): ____________
____

0 1 2 84. Talks too much

0 1 2 85. Teases a lot

0 1 2 86. Temper tantrums or hot temper

0 1 2 87. Threatens people

0 1 2 88. Thumb-sucking

0 1 2 89. Too concerned with neatness or cleanliness

0 1 2 90. Trouble sleeping (describe): ______________________________

____

0 1 2 91. Underactive, slow moving, or lacks energy

0 1 2 92. Unhappy, sad, or depressed

0 1 2 93. Unusually loud

0 1 2 94. Vandalism

0 1 2 95. Wets self during the day

0 1 2 96. Wets the bed

0 1 2 97. Whining

0 1 2 98. Withdrawn, doesn't get involved with others

0 1 2 99. Worrying

0 1 2 100. Please write in any problems your child has that were not listed above:

0 1 2 ____

0 1 2 ____

0 1 2 ____

0 1 2 ____

(Lewis & Feiring, 1982)

S# ____________________

Date ____________________

PRESCHOOL LONGITUDINAL STUDY

FAMILY LIFE EVENTS SCALE

We would like to ask you some questions about events which may or may not have affected your child and family over the past few years. Please feel free to elaborate on any of the information you provide or include any new information which you feel is important. All information will be kept confidential.

1. Has there been a serious illness in your family or close to your family in the last two years? ____________

   Who did this illness involve? (i.e., mother, father, child, relative, friend, please specify). ______________________________

   ____

   What type of illness? ______________________________

   ____

   Child's age at the time. ______________________________

   ____

   Child's reaction to illness. ______________________________

   ____

   General effect on family of this illness. ____________________

   ____

   Was hospitalization required? ____________ How long? ____________

2. In the past two years, has anyone in the family or close to the family been in an accident? ____________________

Who did this accident involve? (i.e., mother, father, child, relative, friend, please specify) ____________________

____

What type of accident was it? ____________________

____

Was hospitalization required? ____________ How long? ________

____

Child's reaction to accident. ____________________

____

Child's age at the time of the accident. ____________________

____

What was the general effect of this accident on the family? ________

____

3. In the past two years, has there been a death in your family? ________

(If yes, was this a death of a relative, friend, teacher, pet, please specify) ____________________

____

Child's age when the death occurred. ____________________

Child's reaction to the death. ____________________

____

What was the general effect of this death on the family? ________

____

4. In the past two years, have there been any unfortunate events such as fire, flood, burglary, etc.? (please specify) ____________________

____

Please briefly describe this event. ____________________

____

Child's age at the time. ____________________

____

Child's reaction to the event. ____________________

____

What was the general effect of this event on your family? __________

____

5. Have the child's parents been separated ________ or divorced ________

Child's age at separation ____________________

Child's age at divorce ____________________

Child's reaction to the separation ______________ divorce __________

____

Have either of the parents remarried? ____________________

With whom is the child living? ____________________

Does the child have any stepbrothers or stepsisters? __________

____

Is the child living with all his/her full brothers/sisters? ________

____

Describe the climate in the family prior to the separation/divorce.

____

____

____

6. In the past two years, have you moved to a new home? ________________

Child's age at the time of the move. ____________________

Child's reaction to the move. ________________________

____

Did this move require a change in schools? _________________

____

7. Has there been any economic hardship (i.e., loss of job, please specify) in the past two years? ________________________________

____

Describe the climate in the household with regard to this occurrence.

____

____

Child's age at time of hardship. ________________________

Child's reaction to hardship. ___________________________

____

____

8. Please describe any events (i.e., friend moving away, death of a pet) in the past two years which were particularly significant to your child—even if others may consider it insignificant. ____________________

9. Please describe any radical changes in your child's behavior. Be sure to mention the age your child was when you first noticed the change, and any factors which you may feel were contributory. ____________________

10. Please describe any events in the last year which have made your child feel particularly good about her/himself. ____________________

11. Please describe any events not indicated above which have particularly upset your child. ____________________

12. Please list all the child's brothers and sisters, their birthdates and year.

	Sex	Birthdate
1)		
2)		
3)		
4)		
5)		
6)		

If the child has acquired a brother or sister, please describe the reaction to each additional family member.

	Child's age at birth of sibling	Child's reaction to birth of sibling
1)		
2)		
3)		
4)		

PRESCHOOL LONGITUDINAL STUDY

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Subject Number____________

Date____________________

FRIENDSHIP QUESTIONNAIRE

Since friendships and peer relations are an important aspect of development, this questionnaire asks information about your child's playmates and activities both at home and at school. Again, all responses will remain anonymous.

1. Does your child have any brothers and/or sisters?

If yes:

	Name	Birthdate
1.		
2.		
3.		
4.		
5.		

2a. If your child was to have a birthday party who would be invited?

Name	Age	Sex	Relation	Handicapped?

b. Who would your child invite?

Name	Age	Sex	Relation	Handicapped?

* Frequency: a. everyday
b. Two-three times a week
c. Once a week
d. Twice a month
e. Other (specify)

3. Who does your child usually play with at home?

Name	Age	Sex	Relation	Is this friend handicapped?	How frequently does your child play with this friend?

4. Who does your child usually play with at school?

Name	Age	Sex	Relation	Frequency*	Handicapped?

5. Where does your child usually play with friends?

____home
____at friends home
____playground
____school

6. Is your child usually supervised by an adult when playing with friends?

Yes ________ No _______

7. Is s/he supervised when playing with brothers and/or sisters? Yes____No____

8. Does he/she often play with his/her brothers and/or sisters? Yes____No____

Subject # ______________

Today's date ______________
Month/Day/Year

PRESCHOOL LONGITUDINAL STUDY

PARENT QUESTIONNAIRE

We would like to ask you some questions about your child. All responses will be confidential. Be sure to read each question carefully. Please answer the questions as completely as possible. We appreciate your help.

A. Subject Information

1. Child's Name ______________________
2. Name of parent filling out this questionnaire ______________
3. Relationship to child ______________
4. What is your child's: Height ________ Weight ________
5. Child's date of birth ______________
   Month/Day/Year
6. How much did your child weigh at birth? ______ lbs ______ ounces
7. Does your child have a handicapping condition? Yes____ No____
   If yes, please describe the child's condition ______________
   ____
8. What areas of functioning are affected by this condition? Please check off all that apply.
   ___vision
   ___hearing
   ___self-help skills
   ___physical impairments
   ___language
   ___social
   ___neurological
   ___cognitive
   ___emotional
   ___health or medical problems (i.e., heart problem, asthma, etc.)
   ___other (please specify: __________
9. How old was the child when he/she was first diagnosed as being handicapped? ______________
10. How old was your child when you first suspected that he/she may have a handicapping condition? ____________
11. Who made the diagnosis? ______________
12. Name of child's present pediatrician, family physician, or pediatric clinic ______________
13. Is your child presently taking medication? Yes___ No___
    If so, what is your child taking? ______________

14. Has your child been hospitalized for any reason? Yes___ No___

If so, what was the reason and when did the hospitalization occur?
____

B. Infant Program

1. Did your child participate in an infant stimulation program? (birth - 3 yrs.) Yes ___ No ___

If so, what program(s) did he/she attend: 1.______________________

2.______________________

2. Where were these programs located? (city, county) 1.______________

2.______________

3. At what age did your child start the infant program? ______________ Month/Day/Year

4. At what age did your child leave the infant program? ______________ Month/Day/Year

5. Was the program:

____center-based

____home-based

____parent group

____other (please specify:______________________________)

6. How many times per week did your child attend the program?__________

7. How long was each session? ____________________

8. If the program was center-based, how many children attended your child's infant program group?____________________

9. Was the program for:

____handicapped infants only

____normal and handicapped infants

C. Preschool Program

1. Is your child currently enrolled or was your child previously enrolled in a preschool program? (3 yrs. - 6 yrs.) ____Yes ____No

If yes, what program(s) does/did he/she attend: 1.__________________

2.__________________

2. Where are/were these programs located? (city, county) 1.______________

2.______________

3. At what age did your child start the program? ______________ Month/Day/Year

4. If your child left this program, how old was he/she at that time?
____
Month/Day/Year

5. How many times per week does/did your child attend the program?________

6. How long is/was each session? ____________________

7. How many children attend/attended your child's program group?_________

8. Is/was the program for: ____handicapped children only
____normal and handicapped children

D. Elementary School Program

1. Is your child currently enrolled in grade school? (elementary school - including kindergarten) (6+years.) ____Yes ____No

Please list the name of your child's present school or program.
____

2. Address of school ____________________________

3. Grade______________

4. Teacher's name ______________

5. Is the school: ____public school
____private school

6. Is your child enrolled in a special education class? ____Yes ____No

If not, does the school provide any additional services (speech therapy, remedial classes, etc.) ____Yes ____No

If yes, what services are offered?________________

How many children are in your child's class?_____________

E. Evaluation

1. When was the last complete evaluation of your child's status made? _____________
Month/Year

2. Who initiated the evaluation?
___teacher
___parents
___child study team
___physician

3. Was the evaluation conducted:

___in a medical center
___in a medical clinic
___in the child's school
___in another school in the district
___other (please specify)___________
____

4. Name of school or medical facility where evaluation was made
____

5. Name of physician or professional conducting the evaluation
____

6. What areas of functioning were evaluated?

___vision
___hearing
___motor
___social
___emotional
___neurological
___health-related
___language
___cognitive
___other (please specify)_________
____

7. Was the evaluation conducted by
___one person
___several persons

8. Who participated in the evaluation (please check off all that were applicable).
___teacher
___social worker
___physical therapist
___occupational therapist
___pediatrician
___neurologist
___special education personnel
___psychologist
___other (please specify)_________
____

9. Since the child's first evaluation, how many complete evaluations have been made? ____________

10. How good do you think the programs your child has attended or is now attending are? Please use the following scale.

1	2	3	4	5
poor	not adequate	adequate	good	excellent

a. Infant program______
b. Preschool program______
c. Present school program______

11. If you are not satisfied with your program, what would you change? ____

____

F. Parent Information

1. Mother's name ____________________________

2. Address ____________________________

____

3. Home telephone number ____________________

4. What is your date of birth? ____________
Month/Day/Year

5. Is mother currently employed?
____No
____1-10 hrs/week
____11-20 hrs/week
____20-30 hrs/week
____30+ hrs/week

If employed, please describe what you do ____________________
____

6. Name of employer ____________________________

7. Address of employer ____________________________

8. Business telephone number ____________________

9. How long have you been employed at this present position? ____________

10. If you are not currently employed, have you ever been employed outside the home? ____Yes ____No

If so, what did you do? ________________________________

11. Who took care of your child during the daytime when your child was an infant?
____day-care center
____mother
____relative
____father
____babysitter (in your home)
____babysitter (in another home)

12. Please indicate the highest level of education achieved by the mother ____________________

13. Father's name ____________________

14. Is father currently employed? ____Yes ____No

    ____Full-time
    ____Part-time

    If yes, please describe what father does ____________________
    ____

15. Name of employer ____________________

16. Address of employer ____________________

17. Business telephone number ____________________

18. Length of current employment ____________________

19. Please indicate the highest level of education achieved by the father ____________________

G. Additional Information

1. Who lives in your home?

Name	Relationship to Child	Age of Person	Sex of Person

2. At what age did your child speak his/her first word? ____________________

3. What were his/her first words? ____________________

4. At what age did he/she first say "mommy" (or some version of mommy)? __________

5. At what age did he/she first say "daddy" (or some version of daddy)? __________

6. At what age did he/she first say own name? ____________________

Please evaluate your child's response in the following situations and choose the response that best characterizes your child's reaction.

6	5	4	3	2	1
very negative (cries, screams, tries to approach mother)	somewhat negative (frowns, whines, avoids looking at person)	cautious (stares at person, stops moving)	no response no change in behavior	somewhat positive (smiles, vocalizes)	very positive (smiles and vocalizes tries to or approaches person

7. How does your child currently respond to his/her grandparents or grandparent (if he/she sees one or more of them more than twice a year) when he or she
____approaches your child
____touches or picks your child up

8. Do you ever leave your child in a room alone?

If yes, please characterize your child/s response in the following situations.

____when your child is alone but could follow you (i.e., the door is open)?
____when your child is alone but could not follow you (i.e., the door is closed)?
____when your child is alone but could hear your voice?
____when your child is alone but could not hear your voice?

9. How does your child react to
____being left with a babysitter
____being left at a program center or at school

10. How does your child react to your return
____after having been left alone?
____after having been left with a babysitter?
____after having been left at a program center or at school?

PRESCHOOL LONGITUDINAL STUDY

DATE: ____________

SUBJECT # : ____________

HOME Observation for Measurement of the Environment

Inventory for Ages 3-6[a]

I. PROVISION OF STIMULATION THROUGH EQUIPMENT, TOYS, AND EXPERIENCES.

	YES	NO
1. Does your child have toys at home that help in learning colors, sizes and shapes? (Examples: toy typewriter, pressouts, play school, peg boards. Circle those toys the child has.)		
2. Does your child have a toy or game that helps in learning letters? (Examples: blocks with letters, toy typewriter, letter sticks, books about letters)		
3. How many puzzles does your child have? (Score "yes" if 3 or more)		
4. Does your child have toys like crayons and coloring books, paper dolls . . . ?		
5. How many records does your child have? (score "yes" if 5 or more)		
6. Does your child own a toy musical instrument? Which ones? ________		
7. Does your child have a toy like finger paints, play dough, crayons or paints?		
8. Does your child have toys such as paint by number, dot book, or paper dolls?		
9. Does your child have toys that help in learning the names of animals? (Examples: books about animals, circus games, animal puzzles)		
10. Does your child have toys which help him/her learn numbers? (Examples: blocks with numbers, books about numbers, games with numbers)		
11. Does your child have building toys?		

a. Caldwell (1970)
Revised to form interview

b. Observation during testing sessions

Note - Items that are inappropriate for the child's competencies will be marked "not appropriate". Proprotion scores will be used to take into account the number of appropriate items.

	YES	NO
12. How many books does your child have? Score "yes" if 10 or more		
13. Do you have many books at home?		
14. Do you get a newspaper every day?		
15. How many magazines do you subscribe to? (Score "yes" if 1 or more)		
16. How many times a month do you or another member of the family take him/her on an outing? (Examples: shopping, picnic) Score "yes" for 2 or more a month.		
17. How many times has your child been to eat at a restaurand in the past year? (Score "yes" if 3 or more)		
18. Has your child been to the airport in the past year?		
19. Has your child been more than 50 miles from home in the past year?		
20. Has your child been to a museum in the past year?		
21. How many times a week does your child go with you to the grocery store? Score "yes" if 1 or more		
SUBSCORE		

II. STIMULATION OF MATURE BEHAVIOR

	YES	NO
22. Is your child encouraged to learn colors?		
23. Is your child encouraged to learn shapes?		
24. Is your child taught nursery rhymes, songs?		
25. Is your child learning the alphabet?		
26. Is your child learning to tell time?		
27. Is your child learning such things as big, little, up, down?		
28. Is your child learning numbers?		
29. Is your child learning to read?		

	YES	NO
30. Does your child put toys away after playing with them by himself?		
31. Does your child share toys with others?		
32. Does your child say "please", "thank you"		
33. If your child is hungry and it is not meal time, do you make him wait until meal time to eat?		
SUBSCORE		

III. PROVISION OF A STIMULATING PHYSICAL AND LANGUAGE ENVIRONMENT

	YES	NO
34. Does your house/apartment have a yard for your child to play in?		
35. Do most of the rooms of your house have windows?		
36. Is there usually sound in your house, , e.g. television, radio, other children?		
37. Does your neighborhood have many trees?		
38. How many rooms are there in the house?		
39. Do you have a lot of free floor space?		
40.[b] Mother used complex sentence structure and some long words in conversation?		
41.[b] Mother used correct grammar and pronunciation.		
42.[b] Mother's speech is distinct, clear and audible.		
43. Is your television used often? (Score "no" if there's no TV)		
SUBSCORE		

IV. AVOIDANCE OF RESTRICTION AND PUNISHMENT	YES	NO
44.[b] Mother does not scold or derogate child more than once during visit.		
45.[b] Mother does not use physical restraint, shake, grab, pinch child during visit.		
46.[b] Mother neither slaps nor spanks child during visit.		
47.[b] Mother does not express over-annoyance with or hostility toward child — complain, say child is "bad" or won't mind.		
48.[b] Child is not punished or ridiculed for speech.		
49. How do you punish ________ for misbehavior? (Score "no" is uses physical punishment)		
50. How do you respond when ___________ spills his/her food or drink? (Score "no" if uses physical punishment)		
SUBSCORE		

V. PRIDE, AFFECTION AND THOUGHTFULNESS	YES	NO
51. Does watch shows like Sesame Street on T.V.?		
52. How often do you read stories or show pictures to ________ each week? (Score "yes" if 3 or more)		
53. Does ________ tell you about his/her experiences?		
54. When reading to or watching T.V. with ___________, where are you and ________ in relation to each other, e.g. on lap, near, another chair? (Score "yes" for lap.)		
55. Do you ever sing to ?		
56. Does ___________ have a toybox or other place to keep his/her things?		
57. If ___________ draws a picture or other art work, is it displayed in your house?		

	YES	NO
58.[b] Mother introduces child to experimenter.		
59.[b] Mother converses with child at least twice during interview.		
60.[b] Mother provides child with something to do or structures situation while she is occupied with the interview.		
61.[b] Mother answers child's questions or requests verbally.		
62.[b] Mother usually responds verbally to child's talking.		
63.[b] Mother spontaneously praises child's qualities or behavior at least twice.		
64.[b] When speaking of or to the child, mother's voice conveys possible feeling.		
65.[b] Mother caresses, kisses or cuddles child at least once.		
66.[b] Mother sets up situation that allows the child to show off during visit.		
SUBSCORE		

VI. PATERNAL STIMULATION

	YES	NO
67. How often does your child spend time with his/her father? (Score "yes" for at least 4 days per week)		
68. Does your child usually eat meals with either you or his/her father?		
SUBSCORE		

VII. ACTIVE STIMULATION

69. Does your child have a bike?		
70. Does your child have trucks, train, doll carriage?		
71. Does your child have a ball, jump rope, swing, jungle gym?		
SUBSCORE		

VIII. INDEPENDENCE FROM PARENTAL CENTRAL

	YES	NO
72. Does your child dress himself		
73. Does your child choose the clothes he will wear?		
74. Does your child choose the food he want to eat for breakfast or lunch?		
75. Does your child choose some of the food while shopping at the grocery store?		
76. Is your child allowed to go to a friend's house to play by himself?		
77. How do you respond to your child if he expresses negative feelings to you? (Score "no" for harsh reprisal.)		
78. How do you respond to your child if he hits you? (Score "no" for harsh reprisal.)		
SUBSCORE		

TOTAL		

Number Items Answered ____________

Number Items Appropriate for Child ____________

PRESCHOOL LONGITUDINAL STUDY

Ss# ________________

Date Rating ________________

Name Rater ________________

1. Examiner's Impression of Child's Object Orientation, Attentiveness, Curiosity

Responsiveness of objects (i.e., Stanford-Benet items, WPPSI blocks)

1. Does not look at or indicate interest in objects
2. Holds objects briefly but does not play with them
3. Plays with objects briefly but quickly loses interest
4. Sustained interest in objects
5. Involved with objects to the extent that he reluctantly relinquishes them when the procedure is finished

2. Examiner's Impression of Child's Goal Directedness

Persistence in effort in task

1. No directed effort; no attempt at an answer
2. Makes a few attempts but is easily distracted; gives up easily
3. Is fairly persistent in achieving a goal (moderate frustration threshold)
4. Persistant efforts to solve a problem even when frustrated
5. Continues to attempt to complete a task even when the task appears difficult or frustrating, reluctant to stop trying to solve problem

(Institute for the Study of Exceptional Children, 1982)

3. Examiner's Impression of Child's Attention Span

Tendency to persist in attending to the task

1. Fleeting attention span
2. Attends but is easily distracted
3. Moderate attention to each task, soon ready for another task
4. Continued interest in a task for long periods
5. Absorption in a toy, task or performance

4. Examiner's Impression of Child's Activity Level

Amount of gross body movement

1. Stays quietly in one place
2. Usually quiet and inactive but responds appropriate to situations calling for some activity
3. Moderate activity but still able to proceed with tests
4. Is active most of the test period; not easy to test
5. Hyperactive; difficult to test

5. **Examiner's Impression of Child's Responsiveness to Examiner**

    1. Avoiding or withdrawn
    2. Hesitant and shy
    3. Accepting
    4. Friendly
    5. Inviting (initating, many positive interactions)

6. **Examiner's Impression of Child's Cooperativeness**

    Cooperation with examiner during test situation

    1. Resists all suggestions, does not cooperate
    2. Resists some tests-at beginning or end; or refuses those he is likely to fail
    3. Accepts tests - neither resistant nor cooperates - passive
    4. Enjoys test situation
    5. Enthusiastic about test situation

7. Examiner's Impression of Child's Fearfulness of Testing

Reaction of testing situation

1. Accepts entire situation with no fear, caution or inhibition
2. Cautious and shy in first few minutes
3. Affected by the test situation moderately and for the first third of the test period
4. Bothered by the test situation most of the period
5. Fearful of the situation to the extent that s/he won't respond to the tests

8. Examiner's Impression of Child's Performance Anxiety

Concern over test results

1. Does not seem to care about performance
2. Slightly interested in whether responses are correct
3. Moderately concerned over responses
4. Often anxious over responses
5. Very nervous about responses.

9. Examiner's Impression of Child's General Emotional Tone

Degree of happiness

1. Child unhappy throughout test period
2. At times unhappy, but responds with interest to procedures
3. Moderately happy; may become upset at certain items
4. Generally happy
5. Radiates happiness; animated' talkative

10. **Examiner's Impression of Parents**

Degree of Comfort and Need to Impress the Examiner During Testing Session

1. Parent very relaxed during entire testing session does not seem concerned with impressing examiner with her outstanding ability as mother or the outstanding brilliance of her child.
2. Parent relaxed during testing session after initial introduction. Parent does not appear anxious to impress experimenter with her or childs capacities.
3. Parent appears somewhat uncomfortable and anxious to form a good impression but seems more relaxed by the conclusion of the testing session.
4. Parent often seems concerned with her and her childs impression and is not relaxed during testing session.
5. Parent very tense during testing very concerned with pleasing the experimenter and giving the impression she and her child respond in the "right" way. Constantly asks for examiner approval or opinion of self and or child.

11. **Examiner's Impression of Parent's Warmth**

Warmth exhibited by the parent during the task. This is general rating based upon the examiners impression. Actions expressing enthusiasm, playfulness, enjoyment of the child or of doing something with the child, understanding, compassion, etc., would contribute to the rating. These may be evident through tone of voice, smiles or other facial expressions and head movement such as nodding, praise, hugs, etc.

Rating Scale of Warmth

1 = No warmth: Mother business like and cold toward C

2 = Warmth exhibited seldom

3 = Warmth expressed somewhat

4 = Warmth exhibited often

5 = Warmth almost always expressed

CAP* LANGUAGE SCALE

Expressive Language

Crying

____ E1. (0-1) Does ______________ cry? ____________

Can you differentiate between different types of cries? ____________

____ E4. (1-2) If yes, what do they mean? ______________________________

(score E4 if baby has a special cry for hunger)

Other Vocalizing

____ E2. (0-1) Does ________________ do any vocalizing other than crying, e.g., coos, babbles, grunts? ______________________________

If yes, does the vocalizing sound like any vowel sounds? Which ones? ______________________________

____ E3. (0-1) (score E3 if "A" and "E")

____ E13. (4-5) (score E 13 if "O" and "U")

____ E12. (3-4) Does ______________ use any sounds like "pa," "ba" or "ma" when babbling? ______________________________

Does ______________ repeat the same syllable while babbling:

____ E5. (1-2) sometimes ____________

____ E11. (3-4) frequently ____________

* Competency Assessment Profile Language Scale, Adapted from the Bzoch-League REEL Scale

Does this happen when the baby is playing alone or with others?

____

____ E9. (2-3) Does ______________ often babble with 2 or more different syllables, e.g., ba-da, ee-aa? ______________________

____ E7. (2-3) Does ______________ sometimes respond to sounds or speech by vocalizing? ______________________________________

Play

When played with, does ________________ vocalize? __________

____ E8. (2-3) If yes, what are the vocalizations and what do they mean?

____

____

(score E8 if laugh or other expression of pleasure)

When playing with objects, does ______________ vocalize? ______

____ E10. (3-4) If yes, what are the vocalizations and what do they mean?

____

____

(score E10 if laugh or other expression of pleasure)

Pleasure and Displeasure

How does ______________ expressure pleasure?

____

____

____ E6 (1-2) (score E6 if has vocal signs for pleasure)

How does ______________ express anger or displeasure?

____

____

____ E14 (4-5) (score E14 if has vocal behavior other than crying)

Babbling

If ________________ is babbling and someone talks, what does he/she do?

____ E15 (4-5)

stops babbling	____	score E15 if either of these
continues a little, then stops	____	
does not stop babbling	____	

____ E16. (5-6) Does ________________ ever start babbling to anyone before the other person has spoken? ______________________________

Babbling Sounds

When babbling, what are the different sounds ______________ uses? (consonant/vowel sounds, e.g., ba, ga) ________________________

____

____ E17 (5-6) Does ______________ repeat same sound over and over in a string several (4) times (e.g., ba ba ba ba)? ________________________

____

____E19 (6-7) Does ______________ put together a sequence of 2 sounds and then repeat it (e.g., ba-ga ba-ga or ba-ba ga-ga ba-ba ga-ga)?______

____

____E18. (5-6) Does ______________ practice and experiment making sounds and noises (when alone or with others)?______________________

Response to Own Name and Familiar Music

____E20 (6-7) When you show ____________ himself/herself in a mirror and say look at the pretty baby, what does he/she do?____________________

(score E20 if baby responds with any vocalizations)

When ______________ hears a familiar song or music, what does he/she do?____

If ______________ babbles, are the sounds he/she makes different from regular babbling, more rhythmic?____________________

____

____E24 (7-8) (score E24 if baby babbles as usual, "sings along")

____E36 (11-12) (score E36 if baby uses a number of different sounds, has rhythm and intonation and seems to be trying to imitate the music. Distinguishable from regular babbling.)

"Talking" Behavior

____E22 (7-8) When ______________ is "talking," does it sound like sentences, even though it is not real words (i.e., has the intonation of sentences and almost sounds like a foreign language)?____________________

____E35. (11-12) When interacting with people, does ____________ talk as in conversation? ________________________

Is this frequent? ________________________

Does ____________ use a number of different sounds? ______

(score E35 if frequent and a number of different sounds)

Vocalization - Gesture Games

____E23. (7-8) Does ____________ play pat-a-cake or peek-a-boo? ________

What does ______________ do when playing the game?

____

Does ______________ vocalize during the game? ________

Are ______________ vocalizations related to the game (for him/her)? ________________________

(score E23 if plays the game using gestures and vocalizations related to the game for him/her)

____E32. (10-11) Does ______________ ever begin a game of peek-a-boo or pat-a-cake with someone else? ________________

How does ____________ initiate the game (e.g., vocalization, gestures)? ________________________

(score E32 if uses gestures and vocalizations)

Use of Gestures and Vocalization to Communicate

____E25. (8-9) Does ____________ use gestures as language (e.g., shaking head for "no"; nodding for "yes")? ________________

When ____________ wants something what does he/she do?

____

____ E38. (12-14) Does ________________ vocalize along with gesturing and pointing?____

____ E42. (14-16) Is most of ______________ communication some real words along with gestures?____

____ E43. (16-18) Or does ________________ now use words rather than gestures to express wants and needs?________________________________

Words

What was ______________ first word__________________________?

(using 1 syllable for a 2-syllable word does not qualify as word)

How old was________________when it first occurred?__________

What does it refer to?________________________________

____ E29. (9-10) Does ______________ use exclamations, e.g., oh-oh, no-no?______

What words does the baby use and what do they refer to?

______________________ ______________________

______________________ ______________________

______________________ ______________________

______________________ ______________________

____ E34. (11-12) (score E34 if 3 words)

____ E37. (12-14) (score E37 if 5 words)

____ E40. (14-16) (score E40 if 7 words)

____ E48. (18-20 (score E48 if 10-20 words)

____E50. (20-22) Does ______________ say more and more new words each month?

____

____E45. (16-18) When was ______________ last word acquired? __________________

(score E45 if word acquisition seems to be continual)

Imitation

Does ______________ imitate things he/she hears? ____________

If yes, what? ____

____

____

____

____E26. (8-9) (score E26 for sounds made by others around him/her)

____E47. (18-20) (score E47 for sounds in the environment--motors, animals)

____E33. (10-11) (score E33 for sometimes trying to imitate new words)

____E44. (16-18) (score E44 for words others are using in conversation)

____E46 (18-20) (score E46 for 2- or 3-word sentences)

Sentences and Conversation

Does ____________________ combine words into simple sentences? ______

If yes, how long are the sentences and give examples.

____

____

____

____

____E49. (20-22) (score E49 if 2-word sentences)

____E52. (22-24) (score E52 if 3-word sentences)

____E55. (24-27) How often does ______________ use 2- or 3-word sentences?

____

(score E55 if "usually")

Referring to Oneself

Does ______________ ever refer to himself/herself? ________

If yes, how? ______________________________

____E53. (22-24) (score E53 if uses own name)

____E59. (27-30) (score E59 if uses pronoun rather than own name)

____E61. (30-33) Does ______________ tell his/her gender when asked "Are you a boy or a girl?" ______________________________

____E63. (30-33) Does ______________ give both first and last name when asked? ________

Pronouns

____E54. (22-24) Does ______________ use some pronouns, although grammar may be incorrect? ______________________________

Does ______________ usually use personal pronouns (e.g., I, you, he she, they) correctly? ______________________________

Colors and Numbers

____E58. (27-30) Can ______________ name any colors correctly? Which ones?

______________ ______________ ______________

(Score E58 if at least one)

____E60. (27-30) Can ____________ repeat any numbers correctly? Which ones?

____________________ ____________________ ____________________

(score E60 if at least 2)

Talk about Pictures

____E62. (30-33) Does ____________ talk about a picture he/she has drawn, when asked?____

____E65. (33-36) Does ____________ use verb forms correctly in talking about what is going on in action pictures?______________________

Other

____E57. (24-27) Does ____________ ask for help with some personal needs (e.g., washing hands, going to the toilet)?____________________

(score E57 even if uses only 1 word to ask for help)

____E64. (33-36) Does ____________ often tell about things that happened to him/her recently?____________________________________

____E66. (33-36) Does ____________ use some plural forms correctly when speaking?

____

RECEPTIVE LANGUAGE

1. What does ______________ -- ____(baby's name) do when

____ R1 (0-1) a. he hears a loud, sudden noise____

____

(R1 = infant startles)

____ R2 (0-1) b. he hears a sound ____

____

(R2 = infant ceases activity)

____ R3 (0-1) c. he hears a familiar, friendly voice________________________________

____

(R3 = infant quiets)

____ R12 (3-4) d. he hears an angry voice____

____

(R12 = infant appears frightened or disturbed)

____ R16 (5-6) e. he hears a warning; e.g., "careful!", "No!"____________________

____

(R16 = infant distinguishes between c, d, e, as evidenced by differing responses)

____R15 (4-5) f. he is crying and someone speaks to him ____________________

____

(R15 = infant stops crying or is soothed)

2. When someone speaks to ________________, does he

	Yes	No	
____R4,5 (1-2)	___	___	a. appear to listen to the speaker (ceases movement; seems to attend)
____R6 (1-2)	___	___	b. smile and look in direction of speaker
____R7, 8 (2-3)	___	___	c. look directly at speaker's face
____R9 (2-3)	___	___	d. watch lips and mouth of speaker
____R10 (3-4)	___	___	e. deliberately turn or attempt to turn toward speaker
____R11 (3-4)	___	___	f. search for a speaker who is out of sight
____R13 (4-5)	___	___	g. usually localize the speaker accurately
____R22 (7-8)	___	___	h. seem to listen to whole conversations between others

3. Infant's responses to words or groups of words.

What does ____________do when he hears

		No Response	Ceases Activity	Turns	Points/ Touches	Other e.g. Voc.
____R23 (6-12)	his own name		(R23)			
____R17 (0-6)	words like mama, daddy, bye bye					
____R19 (6-12)	names of family members					
____R24 (6-9)						
____R41 (12-18)	names of common objects				(R41)	
____R42 (12-18)	names of parts of the body					

____R37 (12-18) 1. At what rate would you say that ______________ seems to be understanding/responding to some new words? ____________________

____

each week? every few weeks? each month?

(R37 - each week)

---

4. Verbal Requests: Does ______________:

	Yes	No	
____R18 (0-6)	___	___	a. stop or withdraw in response to a "no" at least half the time?
____R26 (6-12)	___	___	b. regularly stop activity in response to a "no"?
____R20 (6-12)	___	___	c. respond with gestures to words such as "come", "up", "high", "bye-bye"? comments:

	Yes	No	
____R30 (9-10)	___	___	d. give toys or objects to a parent when asked for them?
____R13 (4-5)	___	___	e. occasionally follow simple commands like "put that down"? comments:

____ ____ f. respond to simple questions like "where is the ball"?

comments:

____R36 (6-12) ____ ____ g. respond verbally to simple requests like "say bye bye"?

comments:

____R34 (6-12) ____ ____ h. respond with gestures to simple requests like "clap your hands" or "so big"

comments:

____R40 (12-18) ____ ____ i. respond to verbal requests to select and bring some familiar object (if mobile) or point to the object (if not mobile)?

____R43 (12-18) ____ ____ j. carry out two consecutive directions with a ball or other object—e.g., "pick up the ball and put it in the box"; "get the ball and give it to me"? (Directions all involve action on one object).

____R45 (12-18) ____ ____ k. identify familiar objects (objects he knows name of) from a group of familiar objects.

____R46 (18-24) ____ ____ l. point to parts of body and clothing when asked?

____R47 (18-24) ___ ___ m. respond appropriately to action words such as "sit down", "come here", "stop that"?

____R48 (18-24) ___ ___ n. respond appropriately to requests using different personal pronouns like, "give it to me", "give it to her"?

5. Pictures

a. What does______________do when you are naming pictures that the two of you are looking at together?____________

____

____R27 (6-12)
____R39 (12-18)

b. If he looks at the pictures as they are named, how long does he look?____

(R27 = 1 minute)

(R39 = 2 minutes)

6. Complex Verbal Requests

____R49 (18-24) a. Does____________usually follow a series of at least 2 simple, but related directions, e.g. "Go to your room, and get your ball." (directions do not focus on just 1 object as in R43).

____R51 (18-24) b. Does_______________recognize and identify (e.g. point to, if he is able) most common objects when they are named?

c. Does_______________recognize and identify pictures of common objects when they are named.

____R52 (18-24) d. If_______________were given a group of 5 or more varied objects--with which he is familiar, but does not play with every day, like household utensils, a pencil, comb, etc.--could he select (point to, gesture toward) one object when asked to?

____R54 (18-24) e. Does_______________understand most complex sentenses (e.g., "When daddy gets home, we'll go visit grandma," or "If you pick up your toys, we'll have some ice cream.")?

____R55 (24-30) f. If ____________were shown several pictures which depict different action words (e.g., eating, sitting, etc.) could he select the picture which matches a particular verb; i.e., if you were to ask him to point to the picture which shows someone eating, could he do so?____

____

____R56 (24-27) g. Does ________________point to any smaller parts of his body (e.g., chin, elbow, eyebrow) when asked to?__________________________

____

____R57 (24-30) h. Does ________________understand and recognize general family name categories. In other words, with a group of people or a picture of a group of people, can he identify grandma, mother, baby, etc.

____

____

____R58 (24-30) i. If ________________were shown several objects (e.g., fork, ball, purse, clock) could he identify them by their function or use? In other words, if you asked him which one do you eat with/ would he pick out, in some way, the fork?_________________________.

____

____R59 (24-30) j. Does ________________understand size differences? If he were' shown a group of similar objects, could he select one of them by size, e.g., from several bowls, could he pick out the "small bowl" (other examples: "the little doll", the "small book").

____

____R61 (30-36) k. Does ________________appear to understand all common verbs? Could he pick out pictures showing the verb? Could he demonstrate the verb himself? Could he recognize an action word being depicted by someone else?____

(any of these responses constitutes "understands")

____R64 (33-36) l. Does __________ show interest in explanations of "why" things are and "how" things function?____________________________

____

____R65 (33-36) m. Can __________ carry out three simple commands, given at one time, e.g. "go to your room, find your jacket and bring it to me."

____

____

____R66 (33-36) n. Does __________ appear to understand prepositions--like on, under, in front of, behind? Given several objects could he follow a series of commands with these prepositions? Note that the commands should ask for something out of the ordinary--e.g., put the doll under the chair.